Saskatchewan
Agriculture, Food
and Rural
Revitalization

2003 GUIDE TO
Crop Protection

SASKATCHEWAN
weeds, plant diseases, insects

This publication is only a guide.
Always refer to the product label for
application details and precautions.

Introduction
Weed Control
Disease Control
Seed Treatments
Insect Control

Resources

Saskatchewan Agriculture, Food and Rural Revitalization

Inquiries	(306) 787-5140

Weed Control Specialist	(306) 787-4673
Insect Control Specialist	(306) 787-4669
Plant Disease Control Specialist	(306) 787-4671
Crop Protection Laboratory (plant disease diagnosis, weed and insect identification, herbicide resistance screening)	(306) 787-8130

Soils & Crops Agrologists

Saskatoon	(306) 933-5285
North Battleford	(306) 446-7475
Swift Current	(306) 778-8291
Tisdale	(306) 878-8807
Yorkton	(306) 786-1508
Indian Head	(306) 695-4250

Irrigation Agrologists

Outlook	(306) 867-5500

Extension Agrologists

Assiniboia	(306) 642-7225
Biggar	(306) 948-3577
Canora	(306) 563-1200
Carnduff	(306) 482-9670
Davidson	(306) 567-4406
Estevan	(306) 637-4606
Hudson Bay	(306) 865-4430
Humboldt	(306) 682-6700
Indian Head	(306) 695-4250
Kelvington	(306) 327-6260
Kindersley	(306) 463-5441
Lloydminster	(306) 825-6470
Maple Creek	(306) 662-5444
Meadow Lake	(306) 236-7600
Moose Jaw	(306) 694-3615
Moosomin	(306) 435-4525
Nipawin	(306) 862-1787
North Battleford	(306) 446-7467
Outlook	(306) 867-5555
Prince Albert	(306) 953-2770
Regina	(306) 787-2344
Rosetown	(306) 882-5454
Saskatoon	(306) 933-5090
Shaunavon	(306) 297-5450
Swift Current	(306) 778-8284
Tisdale	(306) 878-8806
Unity	(306) 228-6400
Watrous	(306) 946-3230
Weyburn	(306) 848-2374
Wynyard	(306) 554-5444
Yorkton	(306) 786-1500

Agriculture and Agri-Food Canada

Saskatoon Research Centre	(306) 956-7200
Scott Research Farm	(306) 247-2011
Melfort Research Farm	(306) 752-2776

University of Saskatchewan

Plant Sciences (formerly Crop Science & Plant Ecology)	(306) 966-5006

Shelterbelts

PFRA Shelterbelt Centre Indian Head	(306) 695-2284

Pesticide Analysis

(herbicide, fungicide or insecticide)

Enviro-Test Labs	1-800-668-9878

Additional information

For more information on herbicides, pesticides, pesticide safety and weed, insect or plant disease control, consult the publications available from your Extension Agrologist at your district Rural Service Centre or visit the Saskatchewan Agriculture, Food and Rural Revitalization Web site: **www.agr.gov.sk.ca**

Rural Service Centres are provided with updates to this publication in May of each year.

Major Poison Control Centres

Saskatoon	Regina
Royal University Hospital	Regina General Hospital
(306) 655-1010	**(306) 766-4545**

Toxicology Centre

University of Saskatchewan
(306) 966-7441

Spill Report

Saskatchewan Environment
1-800-667-7525

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Table 1: Metric Conversion Factors* (Approximate)

Metric Unit	*Metric to Imperial Multiply By*	*Imperial Unit*	*Imperial to Metric Multiply By*	*Metric Unit*
LINEAR				**LINEAR**
centimetre (cm)	x 0.39	inch	x 2.54	centimetre (cm)
AREA				**AREA**
square metre (m²)	x 1.2	square yard	x 0.84	square metre (m²)
hectare (ha)	x 2.5	acres	x 0.4	hectare (ha)
VOLUME				**VOLUME**
litre (L)	x 0.22	gallon	x 4.55	litre
PRESSURE				**PRESSURE**
kilopascals (kPa)	x 0.14	psi	x 6.9	kilopascals (kPa)
WEIGHT				**WEIGHT**
gram (g)	x 0.04	oz	x 28.35	gram (g)
kilogram (kg)	x 2.2	lb	x 0.454	kilogram (kg)
AGRICULTURAL				**AGRICULTURAL**
litres per hectare (L/ha)	x 0.089	gallons/acre	x 11.23	litres per hectare (L/ha)
litres per hectare (L/ha)	x 0.357	quarts/acre	x 2.81	litres per hectare (L/ha)
litres per hectare (L/ha)	x 0.71	pints per acre	x 1.41	litres per hectare (L/ha)
millilitres per hectare (mL/ha)	x 0.014	fl.oz per acre	x 70.22	millilitres per hectare (mL/ha)
kilograms per hectare (kg/ha)	x 0.89	lb per acre	x 1.12	kilograms per hectare (kg/ha)
grams per hectare (g/ha)	x 0.014	oz/acre	x 70	grams per hectare (g/ha)

*EXAMPLE: To convert centimetres to inches, multiply by 0.39; conversely, to convert inches to centimetres, multiply by 2.54. CAUTION: Herbicide labels are in metric units only. Conversion between the Metric and Imperial system may result in confusion. It is recommended to use metric units only.

Guide to Crop Protection 2003

For Reference Until December 31, 2003

This publication is updated annually and replaces
the 2002 and previous issues.

Introduction

How to Use This Book

This publication is only a guide. Always refer to the product label for application details and precautions.

The *Guide to Crop Protection* is divided into three sections: (1) Weed Control; (2) Plant Disease Control; and (3) Insect Control.

To use the information in each of these sections, use the following process:

1. Turn to the charts at the beginning of each section. There is a set of charts for weeds, plant diseases and insect control. Select the chart for the crop you want or plan to grow. Use the chart to match your weed, disease or insect problems with the products available for that crop.
2. Once you have narrowed your product choices down to a few candidates, go to the recommendation section for that product. Products are listed alphabetically. Read the recommendations thoroughly for each product you are considering.
3. Read the product label attached to the container for detailed instructions on application.

This publication is intended to be used as a guide only. Information contained herein is that available at time of printing. While every effort has been made to ensure accuracy, the provincial government does not accept responsibility for label changes. When more than one trade name is listed, not all weeds or tank mixes may appear on all labels. Consult product labels attached to pesticide containers for final detailed instructions.

Certain recommendations in this publication are given in quantity of commercial product per acre (L or kg/acre). Product labels are given in quantity of product per hectare (L or kg/ha). To avoid application errors be sure to read and understand label recommendations.

The *Guide to Crop Protection* includes the most recent recommendations for weed, plant disease and insect control in field and forage crops. These recommendations are based on the uses registered under the Pest Management Regulatory Agency's *Pest Control Products Act*. It is an offence under *The Pest Control Products Act* to apply any chemical in a manner not consistent with the product label. If you have any doubts regarding the instructions in this publication, or on the product label, contact the company representative, your local agricultural office or the Pest Management Regulatory Agency for further advice.

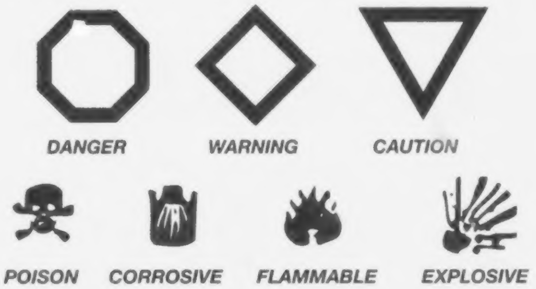
Safe Use of Herbicides, Fungicides and Insecticides

Herbicides, fungicides and insecticides are classified according to the use hazard and risk involved. The categories of hazard are:

- toxicity
- flammability
- explosive potential
- corrosivity

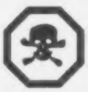
The degree of risk is represented by symbols taken from common traffic sign shapes represented by the stop, caution and yield signs. The signal word for each of the signs is danger (high risk), warning (moderate risk) and caution (low risk). Where the risk is minimal, no designation is required. The label on the container will carry the appropriate signs for the protection of the user. Degree of risk symbols for herbicides, insecticides and fungicides used in field and forage crops are included in the product directory. The symbols are illustrated in Figure 1.

Figure 1. Degree of Risk and Hazard Symbols

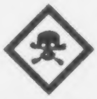


LD_{50} values are used to rate the toxicity of pesticides. The LD_{50} refers to the dose of pesticide (in mg per kg of the test animal's body weight) that is lethal to 50 percent of the group of test animals. For example, if a pesticide has an LD_{50} value of 10 mg/kg, and the test animals each weigh 1 kg, then 50 percent of the animals would die if they each ate 10 mg of the pesticide.

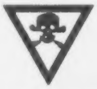
Table 2. Oral LD_{50} Values as they relate to the Risk/Hazard Symbols



DANGER POISON
LD_{50} less than 500 mg/kg
indicates high toxicity



WARNING POISON
LD_{50} 500-1,000 mg/kg
indicates moderate toxicity



CAUTION POISON
LD_{50} 1,000-2,500 mg/kg
indicates low toxicity

SYMBOL ABSENT
LD_{50} greater than 2,500 mg/kg
indicates very low toxicity

Different types of protective equipment are required for pesticides that differ in toxicity. Special equipment requirements are described on the product label, but in general the following precautions must be taken when using pesticides of different hazard ratings.

Danger Poison - requires goggles, respirator, gloves and skin protection, avoid fumes and spray mist.

Warning Poison - requires goggles, gloves and skin protection, avoid fumes and spray mist.

Caution Poison - requires gloves and skin protection, avoid fumes and spray mist.

The absence of a hazard symbol on a pesticide label indicates low toxicity to mammals. Nevertheless, protective clothing should be worn when using pesticides that do not have a hazard symbol.

Protecting Yourself from Exposure to Herbicides, Fungicides and Insecticides

The use of protective equipment and sound safety procedures will help minimize your exposure to herbicides, fungicides and insecticides. Follow the 10 rules for safe application listed below, and wear the safety equipment recommended.

10 Rules for Safe Application

1. Never smoke or eat while applying pesticides.
2. Avoid inhaling sprays or dusts. Wear protective clothing and a respirator.
3. Sprayer lines carrying chemicals should not enter the operator's cab.
4. Have soap, water and a towel available. Should concentrated product spill on skin, hands, face or eyes, wash immediately.
5. Wash hands and face when leaving the treated area, before break periods, lunch or urination.
6. Bathe or shower and change into clean clothing after working with pesticides. Wash clothing each day before re-use.
7. Call a physician or get the patient to a hospital immediately if symptoms of illness occur during or shortly after pesticide application. Be sure to take along the product label or container.
8. Store pesticides out of reach of children and where there is no chance of contact with human food or livestock feeds. Do not store herbicides with insecticides and avoid cross-contamination. Storage areas should be locked.
9. Keep chemicals in their original containers, never in unmarked containers or bottles used for food or drink.
10. Follow proper container disposal methods. All containers should be triple rinsed or pressure rinsed, punctured to render the container non-reusable, and delivered to designated disposal sites.

Protective Clothing

Wear protective equipment as described in the chart to reduce exposure.

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Coveralls	There are two types of coveralls: disposable and reusable. Disposable coveralls are lightweight and comfortable on warm days. They can be worn for mixing and applying pesticides, then discarded at the day's end. If they become contaminated, they should be discarded at once. The second type of coverall is made of washable fabric and may be reused many times. These fabric coveralls are adequate for use with all but the most highly toxic and concentrated pesticides.	Button (or zip) right up to the neck. Loose coveralls around the neck will suck and blow pesticide in and out of the interior of the coveralls as you bend and move. Wear coveralls over a long-sleeved shirt and pants.
Aprons	When pouring or otherwise handling concentrated pesticides, it makes good sense to wear protection in the form of an apron. The apron protects the front of your body from spills or splashes of the concentrate. The apron should be made of rubber or synthetic liquid-proof material that will resist the solvents used in formulating the pesticide.	Make sure the apron covers your body from your chest to your boots.
Gloves	Protect your hands by wearing chemical-resistant gloves. Neoprene gloves provide the best protection. Natural rubber gloves may be used when handling organo-phosphorus or carbamate pesticides. Be sure that they are designed for use with solvents and pesticides. Never use lined gloves, gloves with wristbands or leather gloves.	Put gloves on and roll up the first inch or two of the cuff. That way when you lift your hands, any liquid on the gloves won't drip down your arms.
Hats	Use a chemical-resistant hat, preferably made of washable plastic. The hat may be a hard hat or made of flexible plastic. In either case, it should have a plastic sweatband. Wash and dry entire hat after each use and before storing. Ordinary baseball caps with cloth sweatbands are dangerous as they absorb the pesticide and recontaminate the forehead each time you wear them. Even small amounts of moderately or slightly toxic pesticides may cause severe skin irritation or other illness if exposure continues for several days.	
Boots	Wear chemical-resistant, unlined boots. These boots are available in a variety of styles and materials. Neoprene boots are the best. Knee-length boots offer greater protection because they extend above the lower end of the apron. Avoid leather or fabric boots and shoes because these will absorb pesticides and cannot be cleaned effectively.	Wear your pant legs outside the top of your boots. This will prevent spills and splashes from running into the boot and onto your leg.

Protecting Your Eyes, Face and Lungs

Wear the following equipment to protect your facial area from exposure:

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Goggles	Chemical-resistant goggles keep your eyes safe from both splashing and, if using dry formulations, dusts or granules. Don't use goggles with cloth or elastic headbands as these will absorb pesticides.	Wear goggles snugly on your face so that the sides of your head are protected from splashes. If you wear glasses, make sure you purchase goggles that fit snugly over them. Never wear contact lenses when working around pesticides.
Respirators	Only NIOSH-approved respirators should be used. Do not exchange parts of different respirators. (For example, do not use a cartridge produced by Company "A" with a respirator produced by Company "B" as the combination may not provide adequate protection to the user). Dust masks are ineffective in protecting against herbicide vapours. Similarly, the filters on tractor cabs are intended to remove dust and are not designed to protect against herbicide vapours or mists. Chemical cartridge respirators are recommended for outdoor use when mixing and applying herbicides.	When carrying out operations, change filters each day. The cartridge should be replaced when chemical odour becomes apparent or when breathing becomes difficult. New cartridges should always be installed at the beginning of the spray season. Prior to commencing work, check the face seal while the respirator is on the wearer's face. Regardless of design, respirators cannot be worn securely by people wearing beards, moustaches or sideburns.
Face Shields	Goggles offer some protection, but frequently full-face protection is advised or required according to the pesticide label. It is especially important to protect your eyes and face when pouring or mixing liquid concentrates. Effective face shields are made of clear plastic.	Since the shield attaches to the hard hat, you can raise or lower it as needed.

Avoiding Spray Drift:

To minimize the risk of drift, follow these guidelines:

1. Do not spray in winds above 15 km/h (9 mph).
2. Do not spray under dead calm conditions in early morning, night, or late evening. These are often associated with temperature inversions and the combination of these factors can result in long-distance spray drift (2 km or more). Fog or dust that seems to hang in the air is a good indicator of an inversion.
3. Avoid nozzle pressures above 45 psi (310 kPa) for conventional flat fan tips.
4. Use a minimum of 10 gal/acre (45 L/acre) water for all pesticides unless otherwise specified for the product.
5. Take note of buffer zones identified in the "Restrictions" section of this guide. Do not spray when the wind is blowing towards a nearby sensitive crop, shelterbelt, garden, or water body.
6. Use amine formulations of 2,4-D or MCPA where possible. Use special care when applying volatile herbicides (most herbicides in Group 3 and Group 4, particularly ester formulations). Avoid spraying these products on or immediately before hot days.
7. Ensure that air flow from air assisted sprayers is properly set to minimize airblast rebound and drift for different crop canopies.
8. Operate nozzles at their minimum recommended height. For 80º tips, this is 18" (45 cm), and for 110º tips, this is 12" (35 cm). Orienting nozzles forward allows further height reductions.
9. Special nozzles are now available that create coarse, low-drift sprays. Pre-orifice, Turbo-TeeJet, or venturi-type nozzles are available from a number of manufacturers, and these reduce drift by 50 to 95 percent. (Refer to the section entitled **Herbicide Efficacy with Low-Drift Nozzles**)
10. Consider equipping your sprayer with protective shrouds. A number of different designs are available that can reduce drift between 35 and 75 percent.

For more information on reducing drift refer the Factsheet entitled "Spray Drift – Causes and Solutions" available from your local extension office or at the SAF Website: www.agr.gov.sk.ca

Herbicide Efficacy with Low-drift Nozzles

A number of low-drift nozzles are now available from different suppliers. Well established nozzles, such as the Turbo TeeJet, reduce drift by about 50 percent and provide equivalent efficacy to a standard flat fan nozzle. Newer nozzles ("venturi" types) are best known for their dramatic ability to reduce drift (50 to 95 percent), but information on pesticide efficacy is still scarce. Initial data suggest that these nozzles perform well at conventional carrier volumes, travel speeds, and product rates. Some aspects require special attention:

Pressure: Most venturi-type nozzles require higher pressures to operate properly. Below 40 psi (275 kPa), patterns may deteriorate rapidly resulting in poor overlaps and erratic control. Higher pressures are recommended (60 to 80 psi, or 415 to 550 kPa). Drift potential remains low, even at these high pressures. When using automatic rate controllers, make sure your pressures remain high enough for good nozzle performance.

Water Volume: Droplet size become more important at lower water volumes. Little is known about low-drift nozzle performance at or below 5 gal/acre (23 L/acre). Since low-drift nozzles generate fewer droplets than conventional nozzles, ensure that water volumes are high enough for coverage when using coarse sprays.

Weed Type: Difficult-to-wet weeds, such as wild oats, green foxtail, lamb's-quarters, and cleavers, typically require finer sprays for effective coverage. When using venturi nozzles on these weeds, make sure your pressure is high enough to achieve good coverage. Larger weeds and reduced product rates typically make chemical control more difficult, and these conditions may also reveal some performance differences between nozzles.

Herbicide Type: According to preliminary results, herbicides that belong to herbicide Groups 2, 4, and 9 perform well with venturi nozzles, even at normal pressures (40 psi). Application of herbicides in Groups 1, 6, 8, and 10 may require higher pressures with venturi nozzles to maintain good performance, especially under challenging conditions. Wild oat control may be reduced with the coarsest sprays, even when applied at high pressure.

Check with your chemical representative to see if the manufacturer supports the use of low-drift nozzles with their products.

More information is available in the factsheet "Making Sense of New Nozzle Choices," available from your local extension office or at the SAF Website: www.agr.gov.sk.ca

Handling a Drift Complaint

When spray drift occurs, it is important to take the right steps to resolve the complaint. If you suspect that your crop or property has been damaged because of spray drift, use the following guidelines for resolving the situation.

1. Are you sure that the symptoms or damage you see has been caused by spray drift? Contact your local agricultural office to help determine if the damage is the result of spray drift.
2. Contact the suspected applicator as soon as possible. View the damage with the suspected applicator and determine if that person did, in fact, cause the damage.
3. If the damage was caused by the applicator, determine the extent of the damage and the level of compensation (if any) with the applicator.
4. If the situation cannot be resolved quickly because of disagreements on the extent of damage or level of compensation, contact your local agricultural office to discuss options on how to proceed. Documentation will be required, particularly if insurance companies are involved.
5. The involvement of a private consultant is recommended if documentation is required. Required documentation often includes samples of the damaged plants, photographs, and yield comparisons to determine losses. Your agricultural office can provide you with a list of private consultants in your area.
6. The best approach is to start an open and honest line of communication with the suspected applicator. The majority of drift complaints are resolved quickly and efficiently by communicating with the applicator, without the involvement of outside parties.

Mixing Pesticides

The ability to control a broad range of weeds or other pests in one pass is the advantage that a mix of two or more products allows. If tank mixing is not done in the correct order, the result could be a tank-load of material that may not control the target pests, cause injury to the crop, plug nozzles, or leave an undesirable residue in the tank that will require extensive cleaning. Mistakes like these are costly, could put the user at unnecessary risk of exposure to the products, or create an environmental disposal problem.

To avoid mixing that may result in incompatibilities, **always consult the label of the products that are being used** to learn the correct order. **Remember to add all like components at the same stage of mixing.** The list below is a general rule-of-thumb for mixing pesticides:

1. Fill the spray tank with 1/4 to 3/4 the amount of water required for the application and turn on the sprayer agitation. Check the products that are being used for the correct amount to add. Once agitation has begun, maintain until the tank is emptied.
2. Add any fertilizer or pH adjuster additives to the tank.
3. Add any wettable powders, water dispersible granules (DF, DG, or WDG), or flowable liquid suspensions to the tank. Add dry products slowly to prevent clogged return lines. Allow sprayer to agitate for a few minutes, allowing the product to become completely suspended

in the tank, before adding the next component.

4. Shake any containers of liquid pesticide thoroughly **before adding** to ensure they are well mixed.
5. Add any pesticides that are solutions (SN) (i.e. amines and salts)
6. Add emulsifiable concentrates (EC, SC) (i.e. esters)
7. Add any surfactants or other adjuvants.

Remember to always consult the label for compatible mixes and recommended mixing order.

Many pesticides will break down if left in the tank for an extended period. Try not to mix any more than you can spray at one time. If you need to stop spraying for a short time, leave the sprayer agitation running to keep products from settling or separating in the tank.

Container Disposal

Proper disposal of use containers and unused pesticide is important to protecting the environment and preventing the potential contamination of soil and water resources. Rinse all containers prior to disposal to reduce environmental contamination caused by open dumping of unwanted containers. Only mix as much pesticide solution as is needed to treat the desired area.

Triple Rinsing

Triple rinsing renders used pesticide containers (metal, plastic, glass) more than 99.9 percent free of residues, in most cases.

Here are the steps that should be followed:

1. Empty contents of the container into the spray tank and drain in a vertical position for 30 seconds.
2. Add a measured amount of rinse water or other diluent until container is about one-fifth full.
3. Rinse the container thoroughly and pour the rinsate into the spray tank.
4. Repeat the procedure twice (it should take only about 5 minutes in total).
5. Puncture or break triple rinsed containers to render them non-reusable. Paper bags should be rinsed once prior to disposal.

Pressure Rinsing

Also available are pressure rinsers that can rinse all sizes of empty pesticide containers that can be lifted into position over the spray tank. A 30 second rinse with a pressure rinser is convenient and just as effective as triple rinsing. Pressure rinsers are constructed to be thrust into the bottom of a metal can or plastic jug. Holes, situated laterally in the rinser tip, direct water from a pressurized source against the inner sides of the container and effectively wash the residual pesticide into the spray tank. Some farmers have found it convenient to attach a rinser to the pump on their large water storage tank to minimize container handling. Pressure rinsers have the added advantage of rendering containers useless by automatically puncturing them.

Disposal of Containers

Properly rinsed containers should be delivered to a designated pesticide container disposal site. Contact your ag rep, municipal office or weed supervisor for the locations of pesticide container disposal sites in your municipality.

Sprayer Tank Cleaning

When pesticide application is completed each day it is important to empty and clean the sprayer thoroughly to prevent the breakdown of certain pesticides, prevent adhesion of the pesticide to the sprayer, and to maintain the sprayer parts in good condition. Certain pesticides break down very quickly when left in solution, and several pesticide solutions can be corrosive to sprayer parts. Tank cleaning is especially important when changing from one crop to another or from one pesticide to another. Each year several reports are logged of herbicide damage cause by carryover of product residue in the tank. To avoid the risk of contamination, sprayers should be cleaned as soon as possible after application is completed.

Do not clean sprayers where rinsate can run off into ditches or other water bodies, near sensitive plants or shelterbelts, or where other people or animals are likely to walk, to avoid unnecessary exposure to people, animals and the environment.

There are three basic types of rinse solution for cleaning sprayer tanks. Their recipes and basic procedures are outlined below:

The Ammonia Rinse – Fill spray tank and add 1 L of household ammonia (3%) for every 100 L of clean water needed for the rinse and begin agitation. Allow solution to flush through the booms until the boom is completely filled with ammonia solution and top up the tank with water. Circulate the ammonia solution through the tank and pump system for 15 minutes. Flush hoses and booms with ammonia rinse solution again (minimum 5 minutes) before emptying. Remove nozzles and screens and scrub with 0.1 L household ammonia per 10 L clean water and an old toothbrush. Perform clean water rinse to remove ammonia solution prior to next spray load. Some herbicides recommend leaving the ammonia rinse in the tank over night to improve cleaning potential.

The Fresh Water Rinse – The spray tank cleaning should begin and end with a fresh water rinse to remove the majority of potential contaminants prior to the cleansing process or prior to the next round of spraying. Drain the tank of its previous contents and fill the tank with clean water. Open nozzle valves and pump clean water through the booms and hoses. Top up the tank with more clean water and circulate/agitate for at least 10 minutes and empty the tank of waste water. If this is the first rinse after spraying, a high pressure hose could be used to clean residue from all surfaces in the tank. Do not enter the tank during the cleaning process.

The Detergent Rinse – After rinsing with clean water, fill spray tank and add a heavy-duty detergent at 0.25 L per 100 L of water (some suggest a non-ionic surfactant such as Agral 90 or Agsurf at 0.6 L per 100 L of water). Circulate the mixture for a minimum of 5 minutes and spray out through sprayer nozzles. Nozzles and screens are removed and cleaned individually with the same detergent solution in a small container. Soaking in this solution for several hours also helps to loosen any deposits.

The above solutions are just components of the overall sprayer cleaning process. Typical rinse instructions will repeat a combination of one or two or all of these basic rinses. Below we will give some generic rinse instructions utilizing the basic rinses as components of the larger cleaning procedure. Never enter the tank during the cleaning process as some cleansers may release dangerous gases.

Method A –
Drain contents of tank – 1 to 2 X Water Rinse – 2X Ammonia Rinse – 2X Water Rinse (one just prior to the next spraying event)
Products: 2,4-D, Accent, Accord, Ally, Atrazine, Avadex, Banvel II, Champion Extra, Champion Plus, dichlorprop+2,4-D (Estaprop, Turboprop, Dichlorprop-D), DyVel, Escort, Everest, Express Pack, FlaxMax, Freedom Gold, Fusion, Harmony Total, Laser DF, MCPA, Muster, Muster Gold, Pinnacle, Poast Ultra, Prism, Pursuit Ultra, Refine Extra, Rustler, Sundance, Tordon 22K, Triumph Plus, Unity.

Method B –
Drain Contents of tank – 2x Water Rinse – 2X Detergent Rinse – 2X Water Rinse
Products: Achieve 80 DG*, Achieve Extra Gold*, Basagran, Buctril M, Gramoxone*, HoeGrass, Liberty, Pea Pack, Prevail*, Puma^{120} Super, Reglone Desiccant*, Reward*, Select, Sencor, trifluralin products, Venture*

*Manufacturers of these products recommend adding a non-ionic surfactant such as Agral 90 or Agsurf at 0.6 L per 100 L of water.

Method C -
Drain Contents of tank – Several repetitions of the Water Rinse with nozzles and screens removed and checked for debris.
Products: Amitrol 240, Assure II, Attain, Bladex, Dual II Magnum, Eclipse, glyphosate products, Horizon, Horizon BTM, Prestige.

The above directions are general processes based on the similarities of tank cleaning recommendations between products in each of the herbicide groupings. Always follow the specific instructions on the product label.

Several products in the guide do not have label instructions regarding tank cleaning. In the case of products that have no cleaning recommendations on the label, there are some basic principals that can be applied. Products that are water based formulations can usually be cleaned from spray tanks using Method C above. Products that are formulated as an EC, SC or F (flowable) or use a petroleum based adjuvant should at least us Method B. The detergent breaks down the oil that may be sticking to the side of the tank. Products in Group 2 (most will already have a recommendation) will require the use of Method A. The ammonia in Method A either increases the solubility of the product allowing it to be easily removed from the tank surfaces or neutralizes these products. If the product that is to be cleaned out of the tank is a combination of these elements, use a combination of Methods to clean the tank. In these cases, use a good commercial tank-cleaning product from a recognized source, with both ammonia and detergent as components.

Group 2 compounds can occasionally be trapped on the tank walls by petroleum based formulations or adjuvants when tank mixed with other products, resulting in tank residues. A way to reduce the chance of this occurring is to add detergent at 0.25 L per 100 L to the Ammonia Rinse portion to assist with the breakdown of the petroleum coating so that the ammonia may rid the tank of Group 2 product.

It is very important to clean sprayers immediately after every use. With a more diverse rotation, the likelihood of damage from lack of care increases dramatically.

How to Identify Crop and Weed Leaf Stages

Recognition of plant growth stages is essential for effective weed and disease control. Many herbicides and fungicides are safe on a crop only when applied at a specific growth stage. Similarly, weeds are controlled only when they are at certain growth stages.

For most post-emergent products, growth stages are described by the number of leaves. The following is a description of how to count leaves for staging.

Cereals and Annual Grass Weeds

Manufacturers generally use two different systems of staging for grasses. The minimum stages of application are similar, while the later stages may differ.

Some manufacturers use "Total Leaf Count" stages based on the number of leaves on the entire plant, including tillers or secondary shoots. Most recommendations however, are based on the number of main stem leaves and tillers. Tillers or stools are the secondary shoots or stems of a grass plant. Similar to the branches of a broadleaf plant, tillers will emerge from the axils between the leaf and main shoot. Tillers usually begin to appear at the 3 or 4 leaf stage. When staging a plant in this manner, be sure to identify the tillers first, then count only leaves that originate from the main shoot.

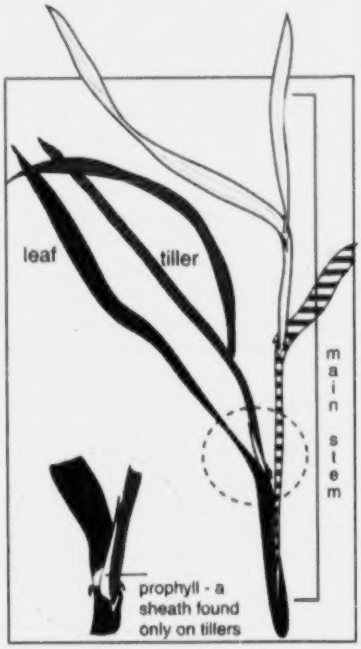
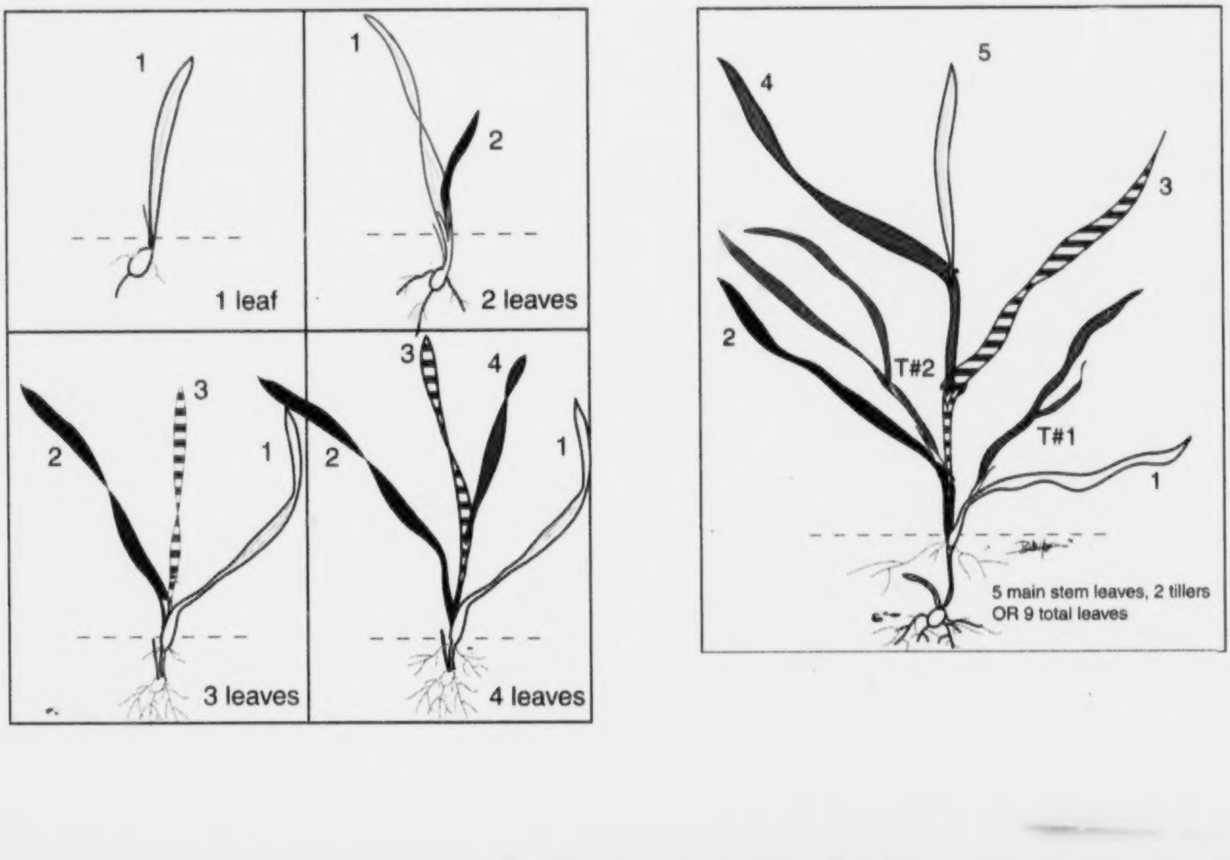
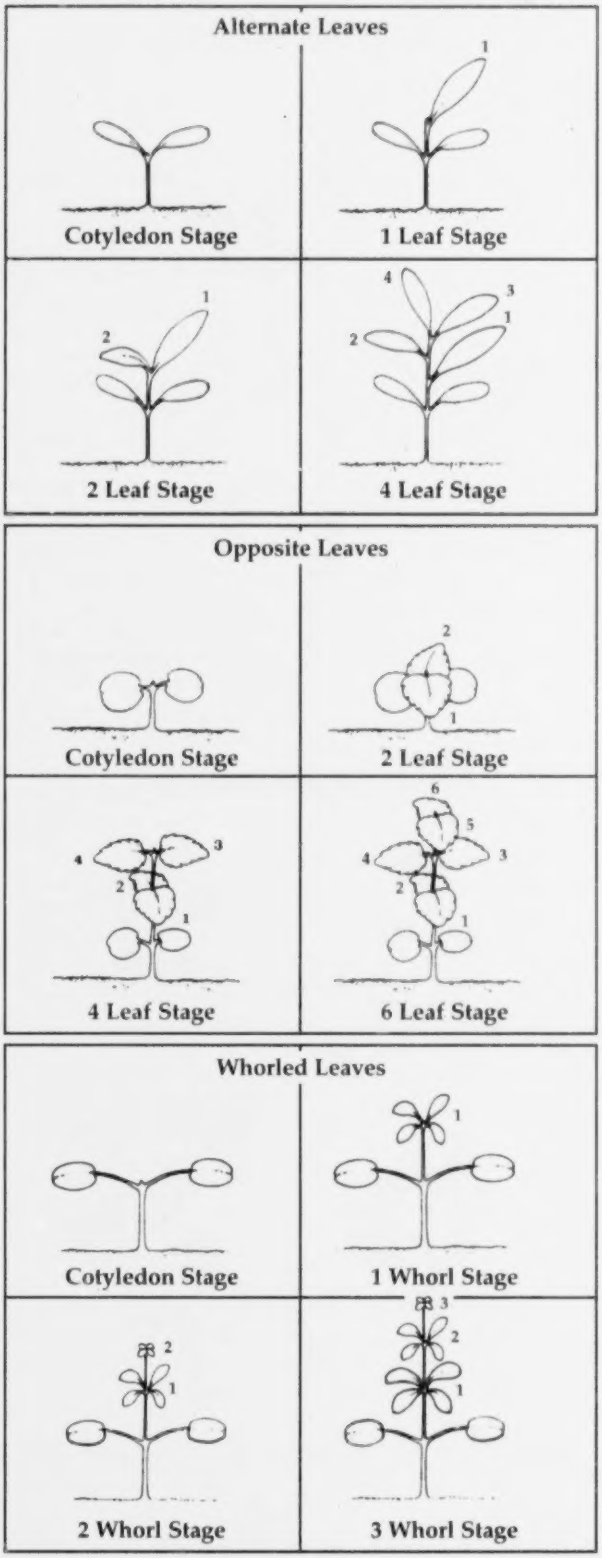


Figure 2. Leaf Stages of Cereals and Annual Grass Weeds



5 main stem leaves, 2 tillers OR 9 total leaves

Figure 3. Leaf Stages of Broadleaf Weeds and Crops


Alternate Leaves
Cotyledon Stage
1
1 Leaf Stage
1
2
2 Leaf Stage
4
3
1
2
4 Leaf Stage
Opposite Leaves
Cotyledon Stage
2
1
2 Leaf Stage
4
3
2
1
4 Leaf Stage
6
5
4
3
2
1
6 Leaf Stage
Whorled Leaves
Cotyledon Stage
1
1 Whorl Stage
2
1
2 Whorl Stage
3
2
1
3 Whorl Stage

Broadleaf Weeds

Cotyledons - These are the seed leaves that usually emerge above ground. On some plants, such as fababeans, lentils and peas, they stay below the soil surface. Cotyledons are not true leaves and are not counted when determining leaf number. They are a different shape than the true leaves and may dry up and disappear at an early stage.

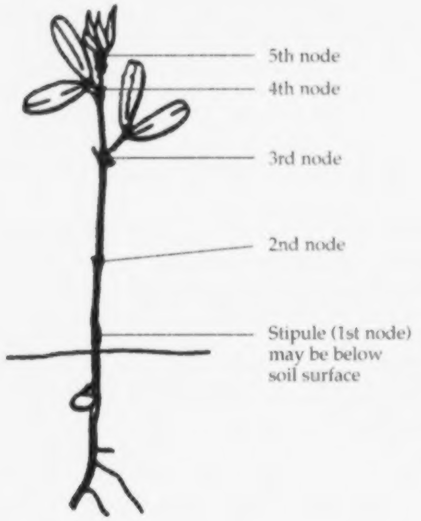
Alternate leaves - Some plants have one leaf at each node on the stem. The next leaf emerges at the next higher node and extends away from the stem in the opposite direction. These plants (lamb's quarters and wild mustard are good examples) are said to have alternate leaves. To determine the leaf stage, simply count the number of leaves present (Figure 3).

Opposite leaves - Plants with two leaves at each node, one on each side of the stem, are said to have opposite leaves. The next pair of leaves on the next node are rotated about 45° so that they are not directly over the previous pair. Plants with opposite leaves have even-leaf numbers only. When counting, the leaf number progresses from cotyledons to 2 leaf, 4 leaf, etc. These plants generally appear shorter than plants with alternate leaves at a similar leaf stage. **Be sure to count each pair as two leaves**. Hemp nettle is a weed that has opposite leaves (Figure 3).

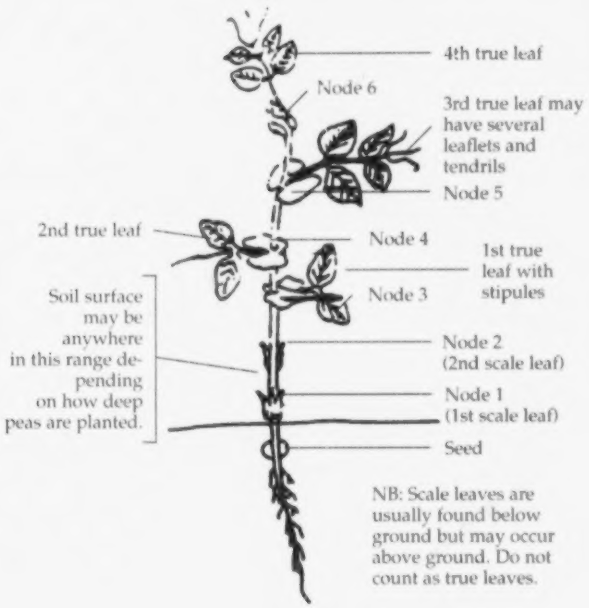
Whorled leaves - More complex plants like cleavers may have whorled leaves. These plants have three or more leaves at each node on the stem. The leaf number in each whorl may vary, so be sure to count each individual leaf unless the Guide or label recommendation refers to the number of leaf whorls (Figure 3).

Figure 4. Leaf Stages of Certain Special Crops and Forages

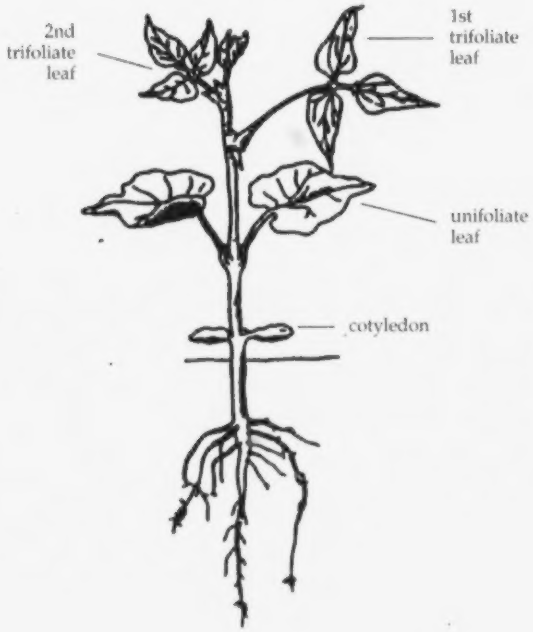
Lentil Seedling


5th node
4th node
3rd node
2nd node
Stipule (1st node) may be below soil surface

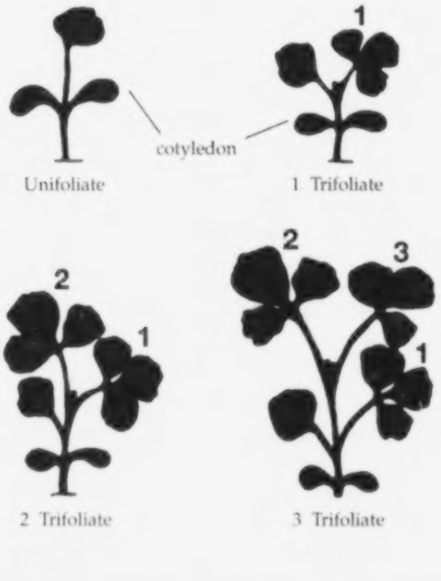
Field Pea Seedling


4th true leaf
Node 6
3rd true leaf may have several leaflets and tendrils
Node 5
2nd true leaf
Node 4
1st true leaf with stipules
Node 3
Soil surface may be anywhere in this range depending on how deep peas are planted.
Node 2 (2nd scale leaf)
Node 1 (1st scale leaf)
Seed
NB: Scale leaves are usually found below ground but may occur above ground. Do not count as true leaves.

Dry Bean Seedling


2nd trifoliate leaf
1st trifoliate leaf
unifoliate leaf
cotyledon

Forage Legume Seedling


cotyledon
Unifoliate
1
1 Trifoliate
2
1
2 Trifoliate
2
3
1
3 Trifoliate

Stages of Alfalfa, Red Clover and Alsike Clover Leaf Development

Weed Control

The use of in crop herbicides to control weeds is often very important in determining the success or failure of a crop. However, many other practices that can be implemented before and after a herbicide application can help to reduce weed competition. The use of these practices is termed Integrated Weed Management.

Integrated Weed Management

A farming system that utilises an array of inter-dependent cultural, biological and herbicidal weed control practices is implementing Integrated Weed Management (IWM). It is essential that IWM involves an array of tools including the rotation of available herbicide groups, ensuring that weeds are exposed to a diverse range of control mechanisms. The principal aim of IWM is to reduce selection for resistance to any single control agent and to delay or prevent the development of herbicide resistant weeds.

Practising IWM does not mean abandoning chemical weed control, just relying on it less. For example:

- You may decide to choose a normal-height wheat or a tall, viny pea variety for a certain field. These crop selections will compete strongly with weeds, possibly allowing you to skip a spray operation.
- You could insert a short-term forage crop into your crop rotation. Studies show that short-term alfalfa stands can reduce wild oat and green foxtail populations by up to 80 percent the year after breaking.
- Early sown barley may give you enough of a "jump" on the weeds that you can avoid herbicide applications.
- Use of vigorous, high-quality seed, sown shallow, can give you better crop competition than poor-quality or deeply sown crop seed.
- Banding nitrogen near the seed can give your crop an advantage over weeds.

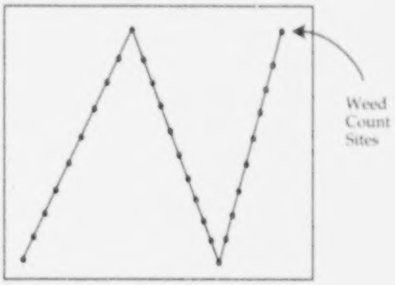
For more information, refer to "Integrated Weed Management: Making it Work on Your Farm" factsheet, available from both Manitoba Agriculture and Food and Saskatchewan Agriculture and Food.

Making Spray Decisions

Field Scouting

Field scouting is an important tool for making informed spray decisions. Accurately assessing the type and number of weeds in the field will help you determine if a spray operation is necessary. The scouting pattern diagram on this page provides a guideline for scouting a field. The entire field should be walked to get a feel for the distribution of the weeds present. A minimum of 20 weed counts should be taken across the field. A smaller number may be used, but be aware that accuracy decreases as the number of counts gets smaller. Count the number of weeds in a 1 m^2 or a 0.25 m^2 area and divide the total number of weeds by the number of counts taken to obtain an average for the field. If using 0.25 m^2 samples, make sure to multiply by four so your average is for a 1 m^2 area.

Some weeds are not distributed uniformly and may be found in patches (for example, Canada thistle) or in low spots. As well, the type and number of weeds found along the field edges may be very different from those found inside the field. These areas should be considered separate from the rest of the field. If possible, patches, low spots, and field borders should be treated separately, as field wide spraying may not be required. Look out for new invading weeds and patches of herbicide-resistant weeds. Herbicide-resistant weeds and new invaders should be controlled, regardless of their number, to prevent them from spreading and becoming a serious control problem. Mapping your field's weed problems will allow you to monitor the spread of weed patches over time and help you assess the effectiveness of your control program.



Yield Losses Caused by Weeds

Knowing the amount of crop yield loss caused by a given weed density will help you decide if a spray operation is required. The tables on the following pages give an indication of the yield loss caused by some of the important grassy weeds of Manitoba.

THESE TABLES SHOULD BE USED ONLY AS A GUIDE. The figures are based on Western Canadian research trials and will not be accurate all of the time. The yield loss values apply only to healthy, well fertilized crops with good stand establishment. Crops that are diseased or emerged unevenly will not compete well with weeds and will suffer larger yield losses than indicated in these tables. The yield loss figures are based on competition from single weed species only. Other weeds, such as wild mustard or Canada thistle, must be controlled if the figures are to be accurate. As well, the tables are based on competition from normal height crops. Semi-dwarf or hybrid varieties may not compete as well with weeds and the figures may not be accurate in these cases.

Table 1. Yield Losses (Percent) in Wheat Caused by Wild Oats.

	Wild Oat Density – Number Per Square Metre																
	1	**2**	**4**	**6**	**8**	**10**	**12**	**14**	**16**	**18**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
Wild Oats are 1 Leaf Stage Ahead of the Crop	1	2	4	6	8	10	12	14	15	17	19	22	26	29	32	34	37
Wild Oats are the Same Leaf Stage as the Crop	1	1	2	4	5	6	7	8	9	10	11	14	16	18	20	22	24
Wild Oats are 1 Leaf Stage Behind the Crop	0	1	1	2	3	3	4	5	5	6	7	8	10	11	13	14	15

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Figure 1. Spray Decision Guideline for Wild Oats in Wheat.

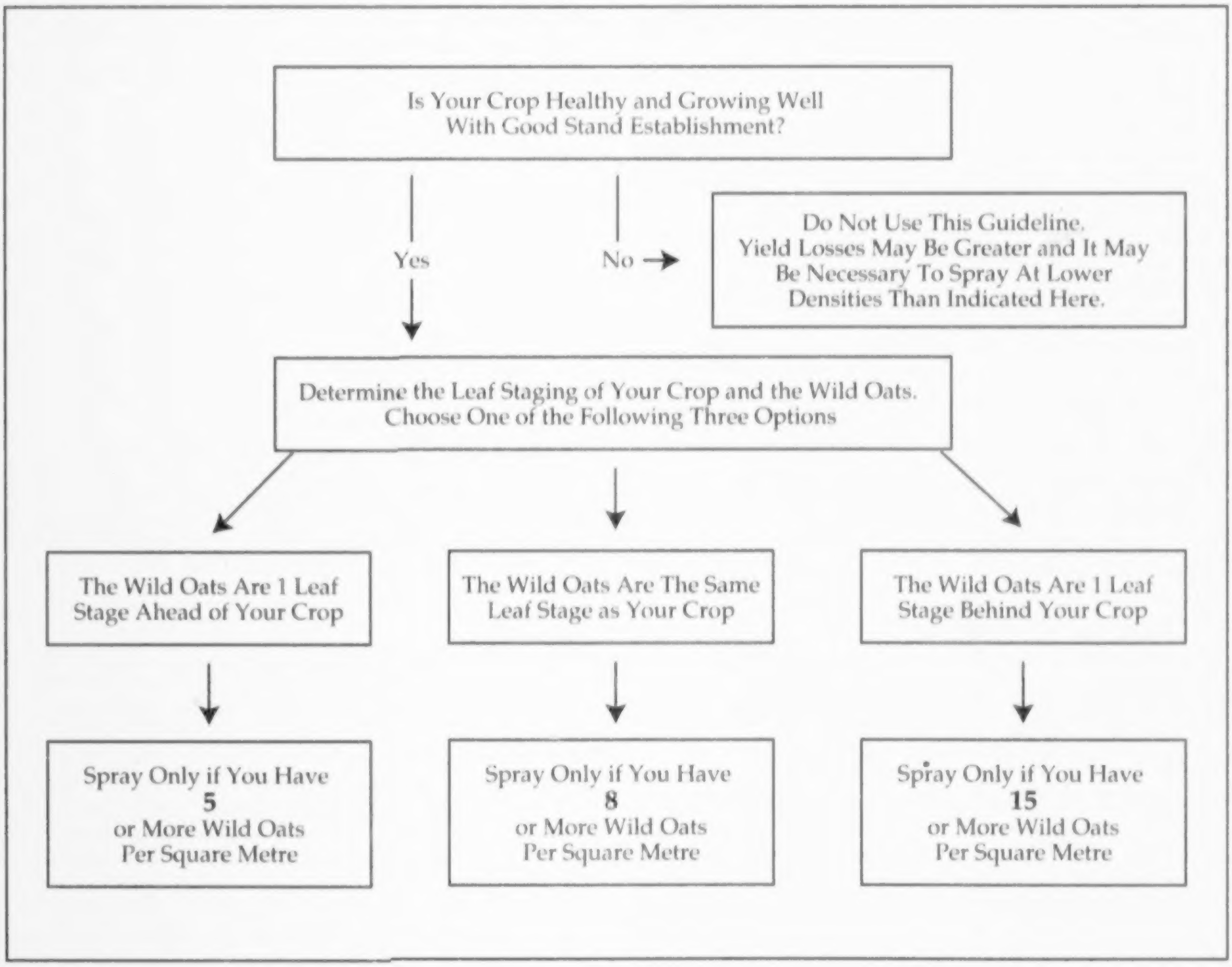
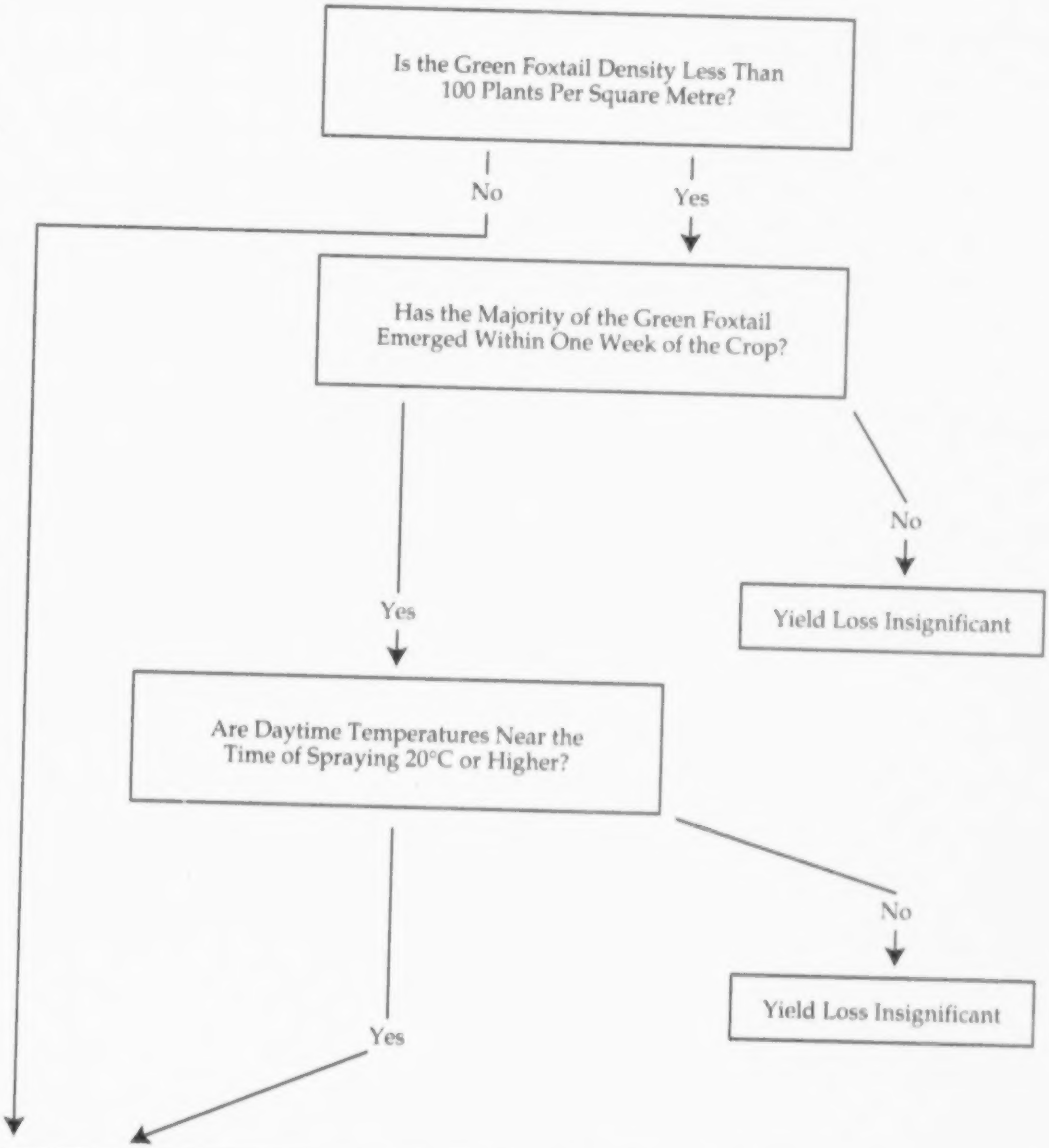

Is Your Crop Healthy and Growing Well With Good Stand Establishment?
Yes
No
Do Not Use This Guideline. Yield Losses May Be Greater and It May Be Necessary To Spray At Lower Densities Than Indicated Here.
Determine the Leaf Staging of Your Crop and the Wild Oats. Choose One of the Following Three Options
The Wild Oats Are 1 Leaf Stage Ahead of Your Crop
The Wild Oats Are The Same Leaf Stage as Your Crop
The Wild Oats Are 1 Leaf Stage Behind Your Crop
Spray Only if You Have 5 or More Wild Oats Per Square Metre
Spray Only if You Have 8 or More Wild Oats Per Square Metre
Spray Only if You Have 15 or More Wild Oats Per Square Metre

Table 2. Yield Losses (Percent) in Wheat Caused by Green Foxtail (Wild Millet).


Is the Green Foxtail Density Less Than 100 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

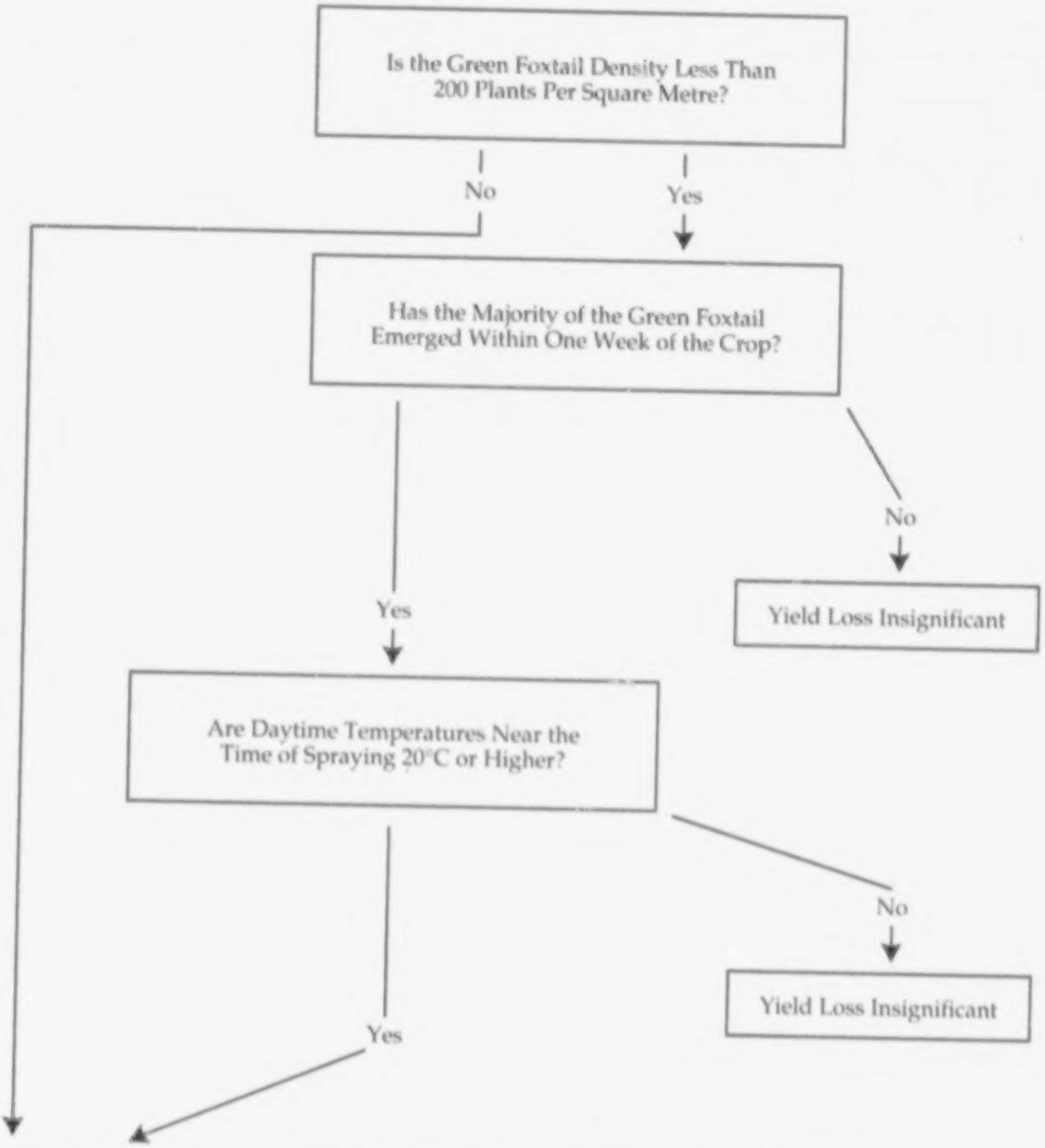
Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	2	3	5	6	7	8	9	11	14	16	18	20	23

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 3. Yield Losses (Percent) in Barley Caused by Wild Oats.

Crop Density (plants/m²)	Relative Emergence	Wild Oat Density (plants/m²)											
		1	5	10	15	20	25	30	40	50	70	100	150
300	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.3	1.4	2.8	4.1	5.4	6.7	8.0	10.3	12.6	16.8	22.4	30.2
	Wild Oats are the Same Leaf Stage as the Crop	0.3	1.3	2.5	3.7	4.8	6.0	7.1	9.2	11.3	15.1	20.3	27.6
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	0.9	1.7	2.6	3.4	4.2	5.0	6.6	8.1	11.0	15.0	20.9
225	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.4	1.9	3.6	5.4	7.0	8.6	10.2	13.1	15.9	20.9	27.4	36.2
	Wild Oats are the Same Leaf Stage as the Crop	0.3	1.6	3.1	4.6	6.1	7.5	8.8	11.4	13.9	18.4	24.4	32.6
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	1.0	2.0	3.0	4.0	4.9	5.8	7.6	9.3	12.6	17.1	23.6
175	Wild Oats are 1 Leaf Stage Ahead of the Crop	0.5	2.3	4.6	6.7	8.7	10.7	12.5	16.1	19.3	25.1	32.3	41.8
	Wild Oats are the Same Leaf Stage as the Crop	0.4	1.9	3.8	5.6	7.3	8.9	10.5	13.6	16.4	21.6	28.2	37.1
	Wild Oats are 1 Leaf Stage Behind the Crop	0.2	1.1	2.3	3.4	4.4	5.5	6.5	8.5	10.4	14.0	18.9	25.9

Table 4. Yield Losses (Percent) in Barley Caused by Green Foxtail (Wild Millet).


Is the Green Foxtail Density Less Than 200 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	1	2	3	3	4	5	6	7	8	10	11	13	14

Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 5. Yield Losses (Percent) in Canola Caused by Wild Oats and Volunteer Cereals.

	Weed Density – Number Per Square Metre												
	1	2	4	6	8	10	12	14	16	18	20	25	30
Wild Oats	3	5	6	8	9	10	11	12	13	14	15	16	18
Volunteer Wheat	1	3	6	8	10	11	12	14	15	16	17	19	21
Volunteer Barley	3	5	8	10	12	14	15	17	18	19	20	23	25

Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta)
O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Figure 2. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Canola.

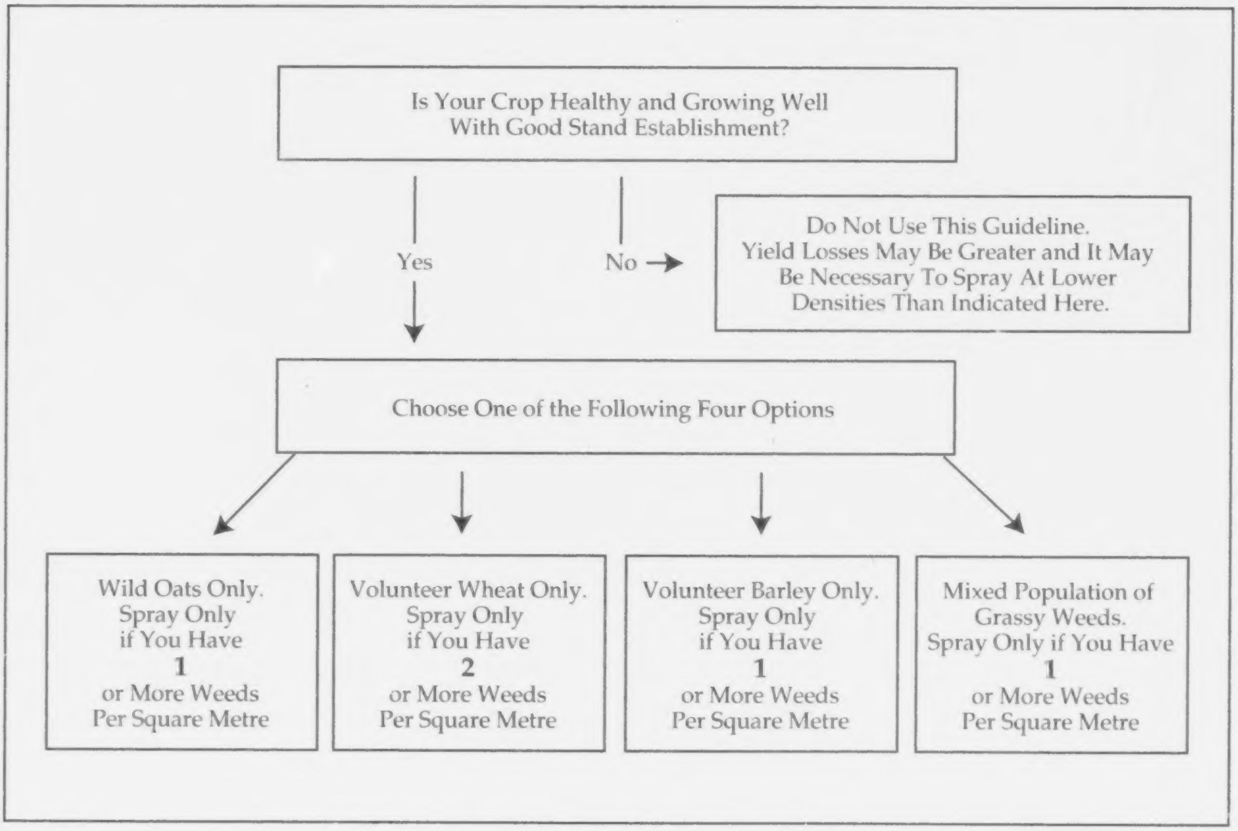
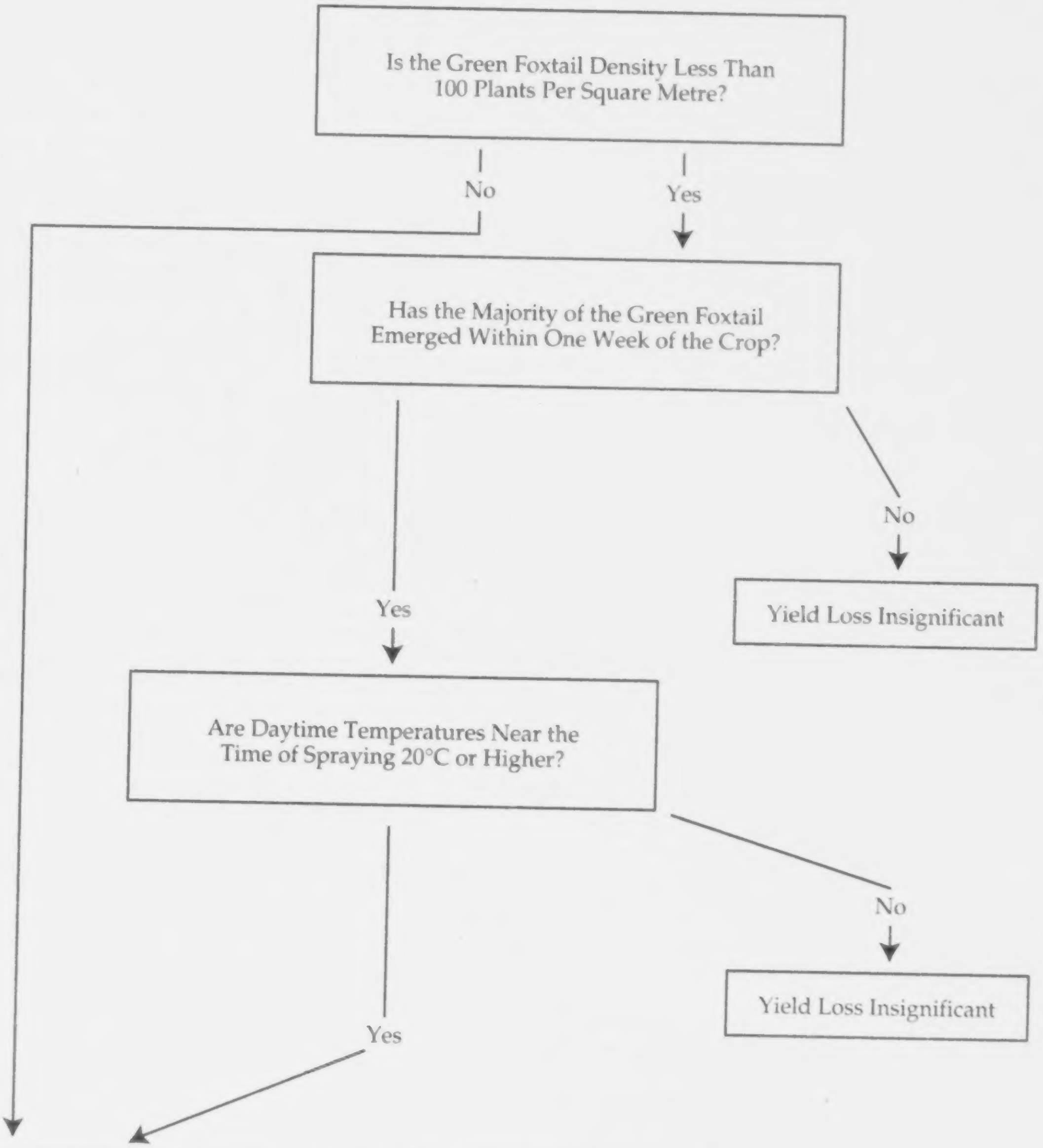

Is Your Crop Healthy and Growing Well With Good Stand Establishment?
Yes
No
Do Not Use This Guideline. Yield Losses May Be Greater and It May Be Necessary To Spray At Lower Densities Than Indicated Here.
Choose One of the Following Four Options
Wild Oats Only. Spray Only if You Have 1 or More Weeds Per Square Metre
Volunteer Wheat Only. Spray Only if You Have 2 or More Weeds Per Square Metre
Volunteer Barley Only. Spray Only if You Have 1 or More Weeds Per Square Metre
Mixed Population of Grassy Weeds. Spray Only if You Have 1 or More Weeds Per Square Metre

Table 6. **Yield Losses (Percent) in Canola Caused by Green Foxtail (Wild Millet)**


Is the Green Foxtail Density Less Than 100 Plants Per Square Metre?
No
Yes
Has the Majority of the Green Foxtail Emerged Within One Week of the Crop?
No
Yield Loss Insignificant
Yes
Are Daytime Temperatures Near the Time of Spraying 20°C or Higher?
No
Yield Loss Insignificant
Yes

Green Foxtail Density (no. per square metre)	50	75	100	125	150	175	200	250	300	350	400	450	500
Yield Loss (percent)	3	4	5	6	8	9	10	13	15	18	20	23	25

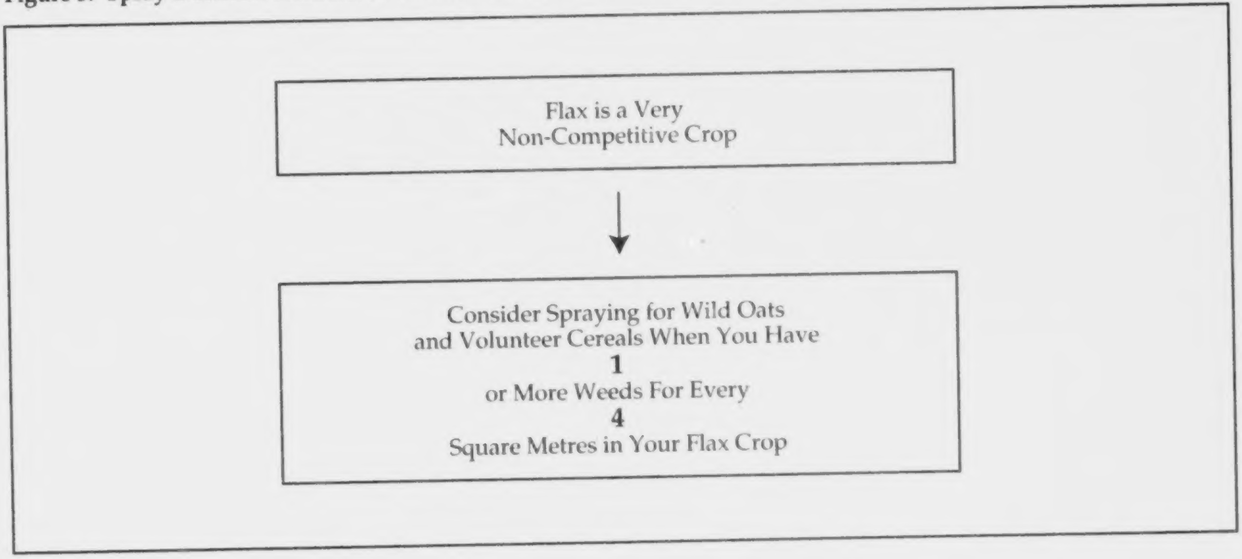
Source: O'Donovan, Alberta Environmental Centre (Vegreville, Alberta)

Table 7. Yield Losses (Percent) in Flax Caused by Wild Oats and Volunteer Cereals.

	Weed Density – Number Per Square Metre									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Wild Oat	6	8	10	12	13	15	16	17	18	19
Volunteer Wheat	6	11	15	18	22	24	27	29	31	33
Volunteer Barley	6	12	16	21	24	28	31	34	36	39

Sources: Dew and Keys, Agriculture Canada (Lacombe, Alberta)
Friesen et al., University of Manitoba (Winnipeg, Manitoba)

Figure 3. Spray Decision Guideline for Wild Oats and Volunteer Cereals in Flax.



Flax is a Very
Non-Competitive Crop

Consider Spraying for Wild Oats
and Volunteer Cereals When You Have
1
or More Weeds For Every
4
Square Metres in Your Flax Crop

Deciding to Spray – Economic Thresholds and Herbicide Resistance

An **economic threshold** is the level of infestation at which lost yield exceeds the cost of the chemical and its application. Determining the economic threshold will help you decide if a spray operation is necessary.

The following example outlines how to determine an economic threshold:

You have a wild oat problem in your wheat. After a thorough field scouting you have determined that your field has an average density of 35 wild oats per square metre. You know that the crop and weeds are at the same leaf stage. Using Table 1, choose the "Same Leaf Stage" row and read across to **35** wild oats per square metre. You will find that your yield loss will be about **18** percent.

You think it could be a 40 bushel per acre wheat crop, and expect to get $3 per bushel for it. Therefore:

40 bushels x 0.18 (percent of expected yield loss) =
7.2 bushels per acre of lost yield

7.2 bushels x $3 per bushel =
$21.60 per acre of lost income

Now find out the price of your herbicide. Most wild oat herbicides for wheat cost about $15 per acre. In this case, lost income exceeds the cost of the herbicide and application, so spraying would be justified.

Alternatively, you may want to use the figures provided with some of the yield loss tables. These figures provide flowcharts to assist you in making spray decisions. In some cases the flowcharts may indicate to spray when you do not have an economic threshold weed density, but most times they will prevent you from spraying unnecessarily.

Another factor to consider when deciding whether to spray is your herbicide rotation. A one in three rotation of herbicide groups is currently recommended to delay the development of herbicide resistance for weeds such as wild oats and green foxtail. Skipping a spray operation will give you an extra year of flexibility in your herbicide rotation. This means that you have one extra herbicide group to choose from the year after you skipped the spray operation. When making spray decisions, the ability to rotate herbicides should be considered in addition to the economics of spraying.

Making the Spray Decision

Remember that economic thresholds should be used only as guides when making a spray decision. Lost income caused by dockage or downgrading must also be considered. **FIELDS THAT ARE NOT SPRAYED THIS YEAR HAVE A HIGHER POTENTIAL FOR PROBLEMS THE FOLLOWING YEAR BECAUSE OF WEED SEED RETURN.** A farmer's experience and common sense play an important role when deciding to spray. Used properly, however, the economic threshold can be an important tool in making spray decisions.

Weed Resistance to Herbicides

In recent years, the number of herbicide-resistant weeds and the areas they infest have increased.

Most herbicide-resistant weed infestations have developed following repeated use of the same herbicide (or herbicide group) for a number of years on the same field. Growers who have developed weed resistance on their farms will typically see a weed, which is normally controlled by a herbicide, escape uncontrolled after a number of years of use of the same product or product group. Individual plants may be resistant to 1.5 up to 10 or more times the normal field rate.

Herbicide Groups

To help you plan your herbicide program, the following table lists "herbicide groups." To slow down the process of developing weed resistance, use products from different groups from year to year on your fields.

Table 1: Herbicide Groups Based on Mode of Action

Group 1 (contain ACCase grasskillers) Achieve, Assure II, Champion^{120} Extra*, Champion Plus*, FlaxMax*, Freedom Gold*, Fusion, Harmony Total*, Hoe-Grass 284/II*, Horizon, Horizon BTM*, Laser DF*, Muster Gold*, Poast Ultra, Prevail*, Puma^{120} Super, Pursuit Ultra*, Select, Triumph Plus*, Venture
Group 2 (contain ALS/AHAS inhibitors) Absolute*, Accent, Ally, Assert, Champion^{120} Extra*, Champion Plus*, Escort, Express Pack*, Everest, Freedom Gold*, Frontline*, Harmony Total*, K2, Laser DF*, Muster, Muster Gold*, Odyssey, Pinnacle, Prism, Pursuit, Pursuit Ultra*, Refine Extra, Spectrum*, Sundance, Triumph Plus*, Ultim, Unity*
Group 3 (contain mitotic inhibitors) Advance, Bonanza, Edge, Fortress*, Heritage, Rival, Treflan
Group 4 (contain growth regulator herbicides) 2,4-D, Absolute*, Accord, Attain, Banvel II, Buctril M*/Mextrol*, Champion Plus*, Clovitox Plus, Compitox, Curtail M, DyVel, DyVel DS, Eclipse*, Embutox, Estaprop, Express Pack*, FlaxMax*, Frontline*/2,4-D, Laser DF*, Lontrel, MCPA, Mecoprop, Pea Pack*, Prestige, Prevail*, Rustler*, Spectrum*, Target/Sword, Thumper*, Trophy, Tropotox Plus, Triumph Plus*
Group 5 (contain photosynthetic inhibitors – triazines) Atrazine, Laddock*, Pea Pack*, Primextra II Magnum*, Princep Nine-T, Sencor, Simadex Simazine, Velpar

Group 6 (contain photosynthetic inhibitors – nitriles/benzothiadiazoles)
Basagran, Buctril M*/Mextrol*, Hoe-Grass II*, Horizon BTM*, Laddock*, Pardner/Koril 235, Thumper*, Unity*

Group 7 (contain photosynthetic inhibitors – ureas/amides)
Afolan F, Linuron, Lorox, Stampede EDF

Group 8 (unknown mode of action)
Avadex BW, Avenge, Eptam 8E, Eradicane 8E, Fortress*

Group 9 (contain inhibitors of EPSP synthase)
Credit, Eclipse*, Factor, Glyfos, Maverick, Renegade, Roundup Dry, Roundup Original, Roundup Transorb, Rustler*, Touchdown, Vantage, Vantage Plus, Victor

Group 10 (contain inhibitors of glutamine synthetase)
Liberty

Group 11 (inhibit carotenoid synthesis - triazoles)
Amitrol 240

Group 14
Reflex

Group 15 (inhibit cell division - benzamides, chloroacetamides)
Dual II Magnum, Frontier, Kerb, Primextra II Magnum

Group 22 (membrane rupture, photosynthetic inhibitors)
Gramoxone, Reglone

*Products contain more than one active ingredient and appear in more than one group. In some instances, both active ingredients act to kill the same weed using different modes of action. In these instances, use of tank mixes may slow down the process of developing weed resistance.

New herbicides do not necessarily have a unique mode of action and may fall within the groups listed in the charts.

Herbicides that have the same mode of action may not control the same weed spectrum or have the same crop safety. For example, Assert and Ally have the same mode of action; however, Assert controls wild oats while Ally does not.

How Herbicides Work

After applying a herbicide, fields can be scouted to determine the effectiveness of the treatment. The symptoms of different herbicide groups, and the approximate time it takes to develop these symptoms, is listed in the table below. Weed patches that are not affected should be noted and checked, as they may be herbicide resistant. Note that symptoms may take longer to develop when conditions are not conducive to rapid plant growth.

Table 2: The Mode of Action, Site of Uptake and Symptoms of Different Herbicide Groups.

Herbicide Group	Mode of Action	Site of Uptake	Weed symptoms/timing	
			Grass weeds	**Broadleaf weeds**
1	Systemic	Foliar	Reduced growth, yellowing of growing point in 1-3 weeks. Newest leaf of affected plant pulls out easily in 3 to 5 days.	Tolerant
2	Systemic	Foliar/Soil	Newest leaves yellowed in 3-10 days, dead in 1-3 weeks.	Discolored (red/yellow/purple) at the growing point and spreading to the whole plant in 1-3 weeks.
3	Systemic	Soil	Reduced emergence, poor root development of emerged plants. Roots often swollen/stunted and root tips darkened.	Reduced emergence, poor root development of emerged plants.
4	Systemic	Foliar	Yellowed / purpled leaves in 1-2 weeks, plant death in 2-4 weeks.	Abnormal growth (twisted stems, cupped leaves) in 2-10 days.
5	Systemic	Soil	Wilted and yellowed oldest leaves, death in 7-10 days.	Wilted and yellowed oldest leaves, death in 7-10 days.
	Contact	Foliar	Yellowed oldest leaves, death within days."	Bleached oldest leaves, death within days.
6	Contact	Foliar	Some leaf burn possible.	Yellowed leaves in 2-4 days, death in 1-2 weeks.
7	Systemic	Soil	Yellowed and stunted plants, death in 10-14 days.	Yellowed and stunted plants, death in 10-14 days.
	Contact	Foliar	Interveinal yellowing of oldest leaves, death within days.	Interveinal yellowing of oldest leaves, death within days.
8	Contact	Foliar	Yellowed leaves in 3-7 days, stunted plants.	Tolerant
	Systemic	Soil	Reduced emergence, emerged leaves dark green/blue.	Reduced emergence, emerged leaves dark green/blue.
9	Systemic	Foliar	Wilted, yellowed leaves in 7-10 days.	Wilting, yellowing of plant in 7-10 days.
10	Contact	Foliar	Wilted, bleached leaves in 3-5 days, death in 1-2 weeks.	Wilted, bleached leaves in 3-5 days, death in 1-2 weeks.
11	Systemic	Foliar	Plants wilted in 2-3 days, bleached and purpling leaves in 1-2 weeks.	Plants wilted in 2-3 days, bleached leaves in 1-2 weeks. Perennial plants die slowly.
14	Contact	Foliar	Some leaf burn.	Leaves yellowed and dessicated in 1-3 days.
15	Sytemic	Soil	Reduced emergence, emerged plants stunted.	Reduced emergence, emerged plants stunted.
22	Contact	Foliar	Leaves wilted within hours, dessicated in 1-3 days.	Leaves wilted in 1-3 days, dessicated and dead in 3-7 days.

How to Identify Weed Resistance

It is important to avoid confusing herbicide failure caused by resistance with herbicide failure caused by various other factors (such as weather or application errors). When a herbicide fails to control weeds because of weather or application factors, that herbicide may work in the field the next season. But when herbicides fail because of the development of resistance, they will fail in subsequent years, regardless of weather or application procedures.

Herbicide resistance should be suspected under the following conditions:

- A weed species that the herbicide controlled in previous seasons now escapes the treatment, while other weeds that appear on the label continue to be controlled in the field.
- The escapes cannot be attributed to adverse weather or emergence after application (if a post-emergence product is in question).
- Irregular-shaped patches of a weed develop where the herbicide gives little or no control.
- Records of the past history of the field show repeated use of the same herbicide, or combinations of herbicides, that kill the weed in question in the same way.

Table 3: Herbicide-Resistant Weeds in Manitoba and Saskatchewan

WEED	DESCRIPTION OF RESISTANCE
Wild oats	Resistant to Group 1 herbicides (see Table 1, p. 27).
Wild oats	Resistant to Group 2 herbicides (see Table 1, p. 27)
Wild oats	Resistant to Group 8 herbicides (see Table 1, p. 27).
Wild oats	Resistant to Group 1, 2 and 8 (see Table 1, p. 27). At present, confirmed in Manitoba.
Green foxtail	Resistant to Group 3 herbicides (see Table 1, p. 27).
Green foxtail	Resistant to Group 1 herbicides (see Table 1, p. 27).
Green foxtail	Resistant to herbicides in both Groups 1 and 3 (see Table 1, p. 27).
Wild mustard	Resistant to Group 4 herbicides (see Table 1, p. 27). At present, confirmed in Manitoba.
Wild mustard	Resistant to Group 5 herbicides (see Table 1, p. 27). At present, confirmed in Manitoba .
Kochia, wild mustard, chickweed, hemp-nettle, Russian thistle	Resistant to Group 2 herbicides (see Table 1, p. 27). Wild mustard, chickweed and hemp-nettle confirmed in Manitoba. Russian thistle confirmed in Saskatchewan.

If Weed Resistance Develops on Your Farm

It is important to identify weed resistance before it spreads across your farm. Plan on conducting a "patch watch" scouting program this summer to identify suspicious patches before they become difficult to manage. Resistant weed patches have been identified on fields where producers were unaware of their existence.

Your patch watch program should begin shortly after spraying and continue through July after the crop has headed out and most weeds are visible from a distance. If you find suspicious looking patches, contact your local agricultural office or crop protection company representative to assist you in confirming weed resistance. If resistance is suspected:

1. Map the location of the patches and mark them with stakes so you will remember their location.
2. Mow, cultivate or spot spray the patches. Resistant patches should not be allowed to produce seed.
3. Patchy areas should NOT be harvested with the rest of the field. Harvest these areas separately, and make sure to clean all harvesting equipment before leaving the area to prevent the spread of seeds across the field or to a neighbouring field.
4. Check patches each year to monitor their spread. Keeping your resistant weeds isolated to a manageable patch is easier than dealing with an entire field of resistant weeds.

Adjuvants and Your Herbicide

Adjuvants are important ingredients in chemical weed control. Many herbicides must be applied with an adjuvant. If it is forgotten, the level of weed control can vary widely, and re-spraying may be necessary.

Most products have adjuvants built into the formulation (e.g. Puma). Other require adjuvant addition (e.g. Refine Extra). Some adjuvants were developed specifically for one herbicide, and these are either pre-packaged with the herbicide, or are identified by name on the label (e.g. Turbocharge for Achieve, Amigo for Select).

With some products, adjuvants need to be added only under certain conditions. For example, glyphosate products have built-in adjuvants, but require additional adjuvant when low rates (pre-seeding or chem-fallow), high water volumes, or certain tank mixes are used.

Adjuvants should be added only when required. If one is not required, addition can reduce weed control or injure crops. Product labels will describe when an adjuvant is required, and what type should be used.

There are two main classes of adjuvants: "activators or spray modifiers" (these include surfactants and crop oils), and "utility modifiers" (these include pH adjusters, water conditioners, low-drift adjuvants, and anti-foaming agents). The most important class of adjuvants is the activators. Surfactants, the main group within the activators, are "*surface active agents*." These chemicals produce effects at points where two substances touch, such as between two liquids (herbicide and water) or between a solid and a liquid (herbicide and leaf surface). Some surfactants act as dispersing agents, helping to keep a pesticide suspended in water. Others work on the plant, improving the wetting, sticking and penetrating characteristics of the herbicide droplets. Oil-based adjuvants contain petroleum or vegetable oil plus an emulsifier that suspends the oil in tiny droplets within the spray solution. Oil-based adjuvants typically assist in herbicide penetration into the leaf.

There are two basic type of surfactants (ionic and non-ionic), of which the non-ionic are most common. The following table lists the surfactants registered for use with herbicides in Western Canada.

Surfactant and Herbicide Registrations:

SURFACTANT	TYPE	HERBICIDE
Agral 90/ Agsurf	Non-ionic	Accent, Ally, Escort, Everest, K2, Glyphosate, Muster, Pinnacle, Pursuit, Prism, Refine Extra, Reglone, Unity
Citowett Plus	Non-ionic	Ally, Basagran (peas), Escort, Muster, Prism, Refine Extra, Unity
Companion	Non-ionic	Ally, Muster, Refine Extra, Unity
Enhance	Blend of Ionic and Non-ionic	Glyphosate
Frigate XL	Ionic	Glyphosate
Super Spreader	Non-ionic	Ally, Unity
LI 700	Non-ionic	Glyphosate

Oil-based Adjuvants and Herbicide Registrations:

OIL-BASED ADJUVANTS	
TRADE NAME	**HERBICIDE**
Amigo	Select
Assist	Basagran (all crops), Laddok
Crop oil or Corn oil	Atrazine
Merge	Absolute, Accord, Flaxmax, Muster Gold II, Odyssey, Poast Ultra, Sundance
Score	Horizon
Sure-Mix	Assure II, Freedom Gold, Muster Gold II
Turbocharge	Achieve
XA Oil Concentrate	Basagran

Crop and Herbicide Recommendation Tables

The ratings in the following charts give general comparisons based on rates, timing and other application instructions and precautions as outlined in this Guide.

The ratings for crop tolerance and weed control are explained below. Where ratings are not given, a dot (•) will indicate if the weed is listed on a product label. Where rate ranges are listed for controlling a given weed, ratings are based on results achieved with the higher rate.

RATING	CROP TOLERANCE	WEED CONTROL
E - Excellent	Consistently exhibits a high degree of tolerance over a wide range of growing conditions.	Consistently provides a high degree of control over a wide range of growing conditions.
G - Good	Exhibits good crop tolerance under most growing conditions.	Provides good control under most growing conditions.
F - Fair	Tolerance is acceptable depending on growing conditions.	Control is acceptable depending on growing conditions.
P - Poor		Provides suppression, but control is often unacceptable.

All ratings are primarily based on the use of the herbicides on their own. Tank mixing herbicides may reduce the control of one or both tank mix partners, or result in a reduced level of crop safety.

Weed Control Tables

Table 1. Weed Control in Barley

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	47	G								P		G	P	E		G	E		E		G	E	F	E	P	P		E	P
Accord[9]	54	E	G	E							E																		
Achieve 80 DG/Liquid	56	G	F	G			G																				G		
Achieve Extra Gold	58	G	F	G			G	E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
Avadex BW/MicroActiv	70	E					G																						
Ally Toss-N-Go + 2,4-D	59	G						F		G				E	G	G	E		F	E	G	E	G	E	F	F		G	
Assert	64	E					G	P											G					G					
Attain	69	G						G		F	E	G	G[11]	E	F	E	E	E	E	F	G	E	G	E	P	P	E	E	
Avenge	74	G					G																						
Banvel II +MCPA/2,4-D	76	F						G			G	G	P	E	P	G	E		E	G	G	E	G	E	F	F		G	F
Buctril M/Mextrol	82	E						E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
Cnampion[10] Extra	85	G	G	E			G	G		E	F				E	•	E	F	E	E	E	G	E	E	F	F		G[4]	
Champion Plus	86	G		E			G	G		G		G		E	E	F	E		E	E	G	E	E	E		P		G[4]	E
Curtail M	88	G						G					G[11]	E		P	E		E	F		E	F	E	G	G		F	G
Dichlorprop + 2,4-D	89	G						G	G			G		E		G	E	F	E	G	G	E	G	E	F	F		G	G
DyVel	92	F						G			F	G		E	F	G	E		E	G	G	E	G	E	F	F		F	F
DyVel DS	93	F						G			F	G		E		G	E	F	E	G	G	E	G	E	F	F		G	F
Express Pack	107	G						F						E		G	E		E	G	G	E		E		F			G
Fortress	110	G		G			G	P								P	P			P	P								
Frontline	114	E						E		E	E		F[11]		G		E		E	E		E	E	E	F	F		E	
Glyphosate (preharvest)	120				G							G[8]													F	G			
Hoe-Grass 284	133	G	G	G		F	G																						
Hoe-Grass II	132	G	G	G		F	G	G	P							F	G		F	F	G		G	F					
Linuron + MCPA amine	146	F		P				G		G		G		E	F	G	E		E	G		E	F	E					
Lontrel	149	E						G																	G	G			
MCPA	151	E										G	P	E	F	F	E		E	F	F	E	P	E	P	P			P
MCPAK	151	E										G		E	F		E		E			E		E	P	P			
Mecoprop	155	G								E	G						E		E							P			
Pardner/Koril	160	E						G				F				F	G		F	F	G		G	F					
Prestige	168	E						E		G	E		G[11]	E	G	E	E	E	E	G		E	G	E	E	E	E	E	F
Prevail	169	G		G			G	F					G[11]	E		P	E		G	F		E	F	E	G	G		F	
Puma[10] Super	174	G	G	E			G																						
Refine Extra Toss-N-Go	179	E						G		E	F			E	F	E	E	F	E	E	E	G	E	E	F	F		G	G
Sencor	190	F							G	G					F		G		G	F	G		G	G				G	
Spectrum	195	E						E		E	E		F[11]	E[11]	E		E		E	F		E	E	E	G	G		E	
Stampede EDF	196	F		G[7]																									
Target/Sword	199	F						G	G		G			E	F	G	E		E	G	G	E	G	E	F	F		G	G
Thumper	201	E						E	F			G		E		G	E		E	G	G	G	G	G				G	G
Trifluralin (foxtail control)	206	E		G																									
Trifluralin (grassy and broadleaf)	208	F	G	G			F	F		G							G			G	G								
Trophy	213	E						F			G	G		E	F	E	E		E	E	G	G	F	G	P	P		E	
Unity[1]	216	E						G		G	G			G	E	G	G		E	G		G	G	E				G	

[1] Not for use in Manitoba. [2] 2,4-D mixes only. [3] MCPA K mixes only. [4] May not give satisfactory control of CLEARFIELD canola varieties. [5] Will not control CLEARFIELD canola varieties. [6] Spring seedlings only. [7] Green Foxtail only. [8] Not registered for control with all glyphosate products. See glyphosate sections for details. [9] Not for use on malting barley. [10] Must be tank mixed for optimal control. [11] Seedlings and overwintered rosettes. • Ratings not yet developed.

Table 2. Weed Control in Oats

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
Banvel II + MCPA	76	F					G			G	G	P[4]	E	F[6]	G	E		E	G	G	E	G	E	F	F		G	F
Buctril M/Mextrol	82	E					E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
Curtail M	88	G					G					G[8]	E		P	E		E	F		E	F	E	G	G		F	G
DyVel	92	F					G			F	G		E	F	G	E		E	G	G	E	G	E	F	F		F	F
Frontline	117	E					E		E	E		P[4]		G		E		E	E		E	E	E	F	F		E	
Glyphosate (pre-harvest)[5]	120				G							G[8]												F	G			
Linuron + MCPA amine	146	F		P			G		G		G		E	F	G	E		E	G		E	F	E					
Lontrel	149	G					F																	F	G			
MCPA	151	E									G	P	E			E		E			E		E	P	P			P
MCPAK	151	E									G		E	F		E		E			E		E	P	P			
Mecoprop	155	G							E	G						E		E							P			
Pardner/Koril	160	E					G				F				F	G		F	F	G		G	F					
Refine Extra Toss-N-Go	179	G					G		E	F			F	E	E	E	F	E	E	E	G	E	E	F	F		G[3]	G
Spectrum	195	E					E		E	E		P[4]	E[6]	E		E		E	E		E	E	E	G	G		E	
Stampede EDF	196	F		G[7]																								
Target/Sword	199	F					G	G		G			E	F	G	E		E	G	G	E	G	E	F	F		G	G

[2] MCPAK mixes only. [3] Will not control CLEARFIELD canola varieties. [4] Spring seedlings only. [5] Not all products registered for use in oat. See glyphosate sections for details. [6] Not registered for control with all products. See glyphosate sections for details. [7] Must be tank mixed for optimal control. [8] Seedlings and overwintered rosettes. • Registered for control, ratings not yet developed.

Table 3. Weed Control in Rye or Triticale

HERBICIDE	PAGE	Crop Tolerance - Rye	Crop Tolerance - Triticale	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D[3,4]	47	G											G	P	E			E		E		G	E		E	P	P			
Achieve[2] 80 DG/Liquid	56	G	G	F	G			G																						
Achieve Extra Gold[2,4]	58	G	G	F	G			G	E	F			G		G		G	E		E	G	G	G	G	G	P	P		F	G
Avenge[2]	74	G	G					G																						
Banvel II + 2,4-D[3,4]	76	F							G			G	G	P	E		G	E		E	G	G	E	G	E	F	F		G	G
Buctril M[3,4]/Mextrol[3,4]	82	E							E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
Hoe-Grass 284[3]	133	G	G	G	G		F	G																						
Hoe-Grass II[2]	132	G	G	G	G		F	G	G	P							F	G		F	F	G		G	F					
MCPA[3,4]	151	E											G	P	E			E		E			E		E	P	P			P
Pardner[3]/Koril[3]	160	E	E						G				F				F	G		F	F	G		G	F					

[1] Fall rye only. [2] Spring rye only. [3] Fall and Spring rye. [4] Rye only; not registered for triticale.

Table 4. Weed Control in Winter Wheat

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	47	G										G	P	E			E		E		G	E		E	P	P			
Achieve 80 DG/Liquid	56	G	F	G			G																						
Achieve Extra Gold	58	G	F	G			G	E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
Avenge	74	G					G																						
Banvel II + MCPA/2,4-D	76	F						G			G	G	P	E	F	G	E		E	G	G	E	G	E	F	F		G	F
Buctril M/Mextrol	82	E						E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
Dichlorprop + 2,4-D	89	G						G	G			G		E		G	E	F	E	G	G	E	G	E	F	F	P	G	G
DyVel	92	F						G			F	G		E	F	G	E		E	G	G	E	G	E	F	F		F	F
DyVel DS	93	F						G			F	G		E		G	E	F	E	G	G	E	G	E	F	F		G	F
Hoe-Grass 284	133	G	G	G		F	G																						
MCPA	151	E										G	P	E			E		E			E		E	P	P			P
Pardner/Koril	160	E						G				F				F	G		F	F	G		G	F					
Refine Extra Toss-N-Go	179	G						G		E	F				E	E	E	F	E	E	E	G	E	E	F	F		G	G
Sencor	190	F												F								F		G					
Target/Sword	199	G						G	G		G			E	F	G	E		E	G	G	E	G	E	F	F		G	G

[1] MCPAK mixes only. [2] Will not control CLEARFIELD canola varieties.

Table 5. Weed Control in Spring Wheat

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Corn	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada	Volunteer Flax	Volunteer Mustard, Canola	Volunteer Sunflowers
2,4-D	47	G								P		G	P	E		G	E		E	G	G	E	F	E	P	P		E	
Accord	54	E	G	E[1]							E																G		
Achieve 80 DG/Liquid	56	G	F	G			G																						
Achieve Extra Gold	58	G	F	G			G	E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
Ally Toss-N-Go + 2,4-D	59	G						F		G				E	G	G	E		E	E	G	E	G	E	F	F		G	
Assert	64	G					G	P											G					G					
Attain[7]	69	G						G		F	E	G	G[2]	E	F	E	E	E	E	E	G	E	G	E	P	P	E	E	
Avadex BW/MicroActiv	70	G					G																						
Avenge[7,8]	74	G					G																						
Banvel II + MCPA/2,4-D	76	G						G			G	G	P	E	F[3]	G	E		E	G	G	E	G	E	F	F		G	F
Basagran + 2,4-D	79	E										G					G		E	F	G	E		E				E	
Buctril M/Mextrol	82	E						E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
Curtail M	88	G						G					G[2]	E		P	E		E	F		E	F	E	G	G		F	G
Dichlorprop + 2,4-D	89	G						G	G			G		E		G	E	F	E	G	G	E	G	E	F	F	P	G	G
DyVel	92	G						G			F	G		E	F	G	E		E	G	G	E	G	E	F	F		F	F
DyVel DS	93	G						G			F	G		E		G	E	F	E	G	G	E	G	E	F	F		G	F
Everest	105	F		E			G																						
Express Pack	107	G						F						E		G	E		E	G	G	E		E		F			G
Fortress	110	F		G			G	P								P	P			P	P								
Frontline	117	E						E		E	E		F[2]		G		E		E	E		E	E	E	F	F		E	
Frontline + 2,4-D	115							•		•	•	•	•[2]	•	S	•	•		•	•	•	•	•	•	S	S			
Glyphosate (preharvest)	120				G								G[4]												F	G			
Harmony Total	131	G	G	G			E	G		E	F			E	E	E	E	F	E	E	E	G	E	E	F	F		G[5]	
Heritage[9]	204	G	•	E			G	F									G												
Hoe-Grass 284	133	G	G	G		F	G																						
Hoe-Grass II	132	G	G	G		F	G	G	P							F	G		F	F	G		G	F					
Horizon	136	G	E	G			E																						
Horizon BTM	137	G	E	G			E	E	F			G		G		G	E		E	G	G	G	G	G	P	P		G	G
K2	138	F		E			G	G		E		F		E	E	E	E	F	E	E	E	E	G	E	F	F		G[5]	G
Laser DF[10]	142	G		G[1]				G		G		G		G	E	F	E		E	E	G	G	G	G	P	P		G[5]	G
Linuron + MCPA amine	146	F		P				G		G		G		E	F	G	E		E	G		E	F	E					
Lontrel	149	E						G																	F	G			
MCPA	151	E										G	P	E	F[3]		E		E			E		E	P	P			P
Mecoprop	155	G								E	G				F	F	E		E	F	F			P		P			
Pardner/Koril	160	E						G				F				F	G		F	F	G		G	F					
Prestige	168	E						E		G	E		G[2]	E	G	E	E	E	E	G		E	G	E	E	E	E	E	G
Prevail	169	G		G			G	F					G[2]	E		P	E		E	F		E	F	E	F	G		F	
Puma[10] Super	174	G	G	E[1]			G																						
Refine Extra Toss-N-Go	179	E						G		E	F			E	E	E	E	F	E	E	E	G	E	E	F	F		G[5]	G
Sencor	190	F							G	G					F		G		G	F	G		G	G				G	
Spectrum	195	E						E		E	E		F[2]	E[6]	E		E		E	E		E	E	E	G	G		E	
Stampede EDF	196	F		G[11]																									
Sundance	198	G		F	F		G			E	E								E	E				E				G[5]	
Target/Sword	199	G						G	G		G			E	F	G	E		E	G	G	E	G	E	F	F		G	G
Thumper	201	E						E	F			G		E		G	E		E	G	G	G	G	G				G	G
Trifluralin (foxtail control)	206	E		G																									
Triumph Plus[7,8]	212	G		E			G	G		G		G		E	E	F	E		E	E	G	E	E	E		P		G[5]	E
Trophy	213	E									G	G		E	F	E	E		E	E	G	G	F	G	P	P		E	
Unity[7]	216	E						G		G	G			G	E	G	G		E	G		G	G	E				G	

[1] Green foxtail only. [2] Spring seedlings and overwintered rosettes. [3] MCPA K mixes only. [4] Not registered for control with all products. See glyphosate sections for details. [5] Will not control CLEARFIELD canola varieties. [6] Spring seedlings only. [7] Not registered for durum wheat. [8] Not recommended for all spring wheat varieties. Check product listing for details. [9] Not for use in Manitoba. [10] Tank mix with 2,4-D ester when applying to durum wheat. [11] Must be tank mixed for optimum control.

• Registered for control, ratings not yet developed.

Table 6. Weed Control in Corn

HERBICIDE	PAGE	Barnyard Grass	Volunteer Cereals	Foxtail, Green	Foxtail, Yellow	Wild Oats	Quackgrass	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species, Lady's-thumb	Sow Thistle (Perennial)	Stinkweed	Sunflower, Volunteer	Thistle, Canada	Volunteer Canola
2,4-D	47									P		G	P	E	G	E	E	G	G	E	F	P	E	P	P	E
Accent	53	•		•	S	•	•																			
Atrazine	67					•		•								•	•	•			•					
Banvel II	76							•			•				•	•	•	•			•	S			S	
Banvel II + 2,4-D amine	76							•			•	•	S	•	•	•	•	•	•	•	•	S	•	•	S	•
Basagran/Basagran Forté	79									•		•				•	•	S	•	•	•		•		S	
Buctril M/Mextrol	82							•	•			•		•	•	•	•	•	•	•	•		•	•		•
Dual II Magnum	91	•		•	•													S								
DyVel DS	93							G			F	G		E	G	E	E	G	G	E	G	F	E		F	G
Eradicane	101	•	•	•	•	•	S			•						•		•								
Frontier	114			•																						
Laddok	141									•		•				•	•	•	•		•					
MCPB + MCPA	154															•	•	•		•		S	•		S	•
Pardner/Koril	160							G				F			F	G	F	F	G		G		F			
Primextra II Magnum	171	•		•	•			•								•	•	•			•					
Roundup Transorb[1]	120	E	E	E	E	E	F	G	G	E	E		F	E	E	E	E	E	E	E	E	F	E	E	F	
Ultim[2]	215	•	•	•	•	•	•											•								

Controlled   S – Suppression

For use on Roundup Ready varieties only. [2] See product page for registered corn varieties.

Table 7. Weed Control in Peas

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp Nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada
Assure II	86	E	G	E[1]	F	E	E	G																		
Avadex BW	70	E						G																		
Basagran/Basagran Forté	79	F									F	F	F					F	F	P	F	F	F	F		P
Edge	97	G	E	E		P	F	G	G		G	P				P	G	E		G	P		P			
Fusion	118	E	G	E[1]		E	E	G																		
Glyphosate (preharvest)	120				G									G[2]											F	G
Hoe-Grass 284	133	G	G	G				G																		
MCPA Sodium Salt/Amine	151	F													P			P	G			P		P		
MCPB + MCPA	154	F														F		G	G	G		G		G	P	P
Odyssey	159	G	G	E[1]		G	G	G	F		E	E			E	F	F	P	E	E	E	E	G	E		
Pea Pack	162	F																G	E	G				G		
Poast Ultra	165	E	E	E	F	E	E	G																		
Pursuit	176	G		P				F	G		G	G				G		P	E	G		G	G	E		
Pursuit Ultra	177	G	E	E	F	E	E	G	F		G	G				F			E	G			F	G		
Select	188	E	E	E	F	E	E	G																		
Sencor	190	F									G					F		G	G				G	G		
Trifluralin	204	G	G	G				F	F		G							G		G	G					
Venture	221	E	E	F	F	E	E	G																		

reen foxtail only.   • Registered for control, ratings not yet developed.
ot registered for control with all products. See glyphosate sections for details.

Table 8. Weed Control in Other Pulses

	CROP							ANNUAL WEEDS																				PERENNIALS			
HERBICIDE	PAGE	Bean, Dry	Fababean	Lentil	Chickpea	Soybean	Sweet White Lupin	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Volunteer Barley	Volunteer Wheat	Wild Oat	Buckwheat, wild	Chickweed	Cleavers	Cocklebur	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Nightshade, Hairy	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass
Assure II	66			X		X		G	E		E	E	G																		F
Basagran/Basagran Forté[1]	79	X	X			X									F	F	F			F	F	F	P	F	F	F	F	P			
Dual II Magnum	91	X				X	X	G	G	G													P								
Edge	97	X		X		X		E	E	E	P	F	G	G	G	P		P	G	E			G	P		P					
Eptam	99	X						G	G	G	F	F	G		G					G			G								
Frontier[1]	117	X							•																						
Fusion	118			X				G	E		E	E	G																		
Glyphosate (preharvest)	120	X		X		X																						G	G[4]	F	G
Hoe-Grass 284	133	X	X	X		X		G	G	G			G																		
Liberty (desiccant only)	144			X																											
Linuron	146					X[2]	X[2]	S	•	•				•	•								•		•	•	•				
Pinnacle	163					X														•	•		•			•					
Poast Ultra	165	X	X	X	X	X		E	E	E	E	E	G																		F
Pursuit[3]	176	X																				G									
Reflex + Basagran	181	X[5]													F					•	•		•		•	•	•				
Select	188	X		X	X	X		E	E	E	E	E	G																		
Sencor (post-emergence)	190			X	X										F			F		F	F					F	F				
Sencor + Treflan (PPI)	190		X			X		G	G	G			F	F	G			F		G	G		G	G	G	G	G				
Sencor + Edge (PPI)	190		X					G	E	E	F	F	G	G	G	F		F	G	E	F		G	F		G	F				
Trifluralin	204	X	X	X		X		G	G	G			F	F	G					G			G	G							
Venture	221			X		X[4]		E	F	F	E	E	G																		F

[1] White and Kidney beans only. [2] Pre-emergent surface treatments only. [3] Pinto, pink an Red beans only. (Refer to Pursuit section for full list of weeds controlled).
[4] Not registered for control with all products. See product section for details. [5] For use on navy beans in the Red River Valley of Manitoba. Does not include Basagran Forté.
• Registered for control, ratings not yet developed (S) Registered for suppression.

Table 9. Weed Control in Flax and Solin (Low Linolenic Acid Varieties). Not all products are registered for use on Solin.

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Quackgrass	Volunteer Cereals	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp Nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada
Assure II[1]	66	E	G	E		F	E	G																			
Avadex BW	70	E						G																			
Basagran/Basagran Forté	79	F									F	F	F					F		F	P	F	F	F	F		F
Buctril M[1]/Mextrol	82	F							E	F			G		G		G	E		E		G	G	F	G	P	P
Eptam[1]	99	F	G	G	G		F	G			G							G			G						
FlaxMax	108	F	E	E	E		G	G	F					G[2]	E			E		E	P		E	P	E	G	G
Fortress	110	G		G	G			G	P								P	P			P	P					
Fusion	118	E	G	E			E	G																			
Glyphosate (preharvest)[4]	120					G								G[5]												F	G
Hoe-Grass 284	133	G	G	G	G			G																			
Hoe-Grass II	132	F	G	G	G			G	G	P							F	G		F	P	G		G	F		
Lontrel	149	E							G																	F	G
MCPA/MCPAK	151	F											G	P	E	F		E		E			E		E	P	P
Pardner[1]/Koril	160	F							G				F				F	G		F	F	G		G	F		
Poast Ultra[1]	165	E	E	E	E	F	E	G																			
Select[1]	188	E	E	E	E	F	E	G																			
Stampede EDF	196	F		G[6]																							
Trifluralin	204	F	G	G	G			F	F		G							G			G	G					
Venture	221	E	E	F	F	F	E	G																			

[1] Registered for use on Solin (low linolenic acid varieties). [2] Spring seedlings only. [3] Not recommended for use on flax in Saskatchewan. [4] Not all products registered for use in flax. See glyphosate sections for details. [5] Not registered for control with all products. See glyphosate sections for details. [6] Must be tank mixed for optimal control.

Table 10. Weed Control in Canola

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada
Absolute[2]	51	G	G	E			G	G	G	G		E	G			E	E	F	P		E	E	E	E	G	E	G	G
Assure II	66	E	G	E		F	E	E	G																			
Avadex BW	70	E							G																			
Eclipse[4]	95	G		E		F	E	E	E	G	G	E	E		F		E	E	E		E	E	E	E		E	G	G[6]
Edge	97	G	E	E	E		P	F	G	G		G	P				P	G	E			E	P		P			
Fortress	110	G		G	G				G	P								P	P			P	P					
Freedom Gold[2]	112	F	E	E		F	E	E	G	G		E					E	E	E		E	E	G		E	E		
Fusion	118	E	G	E			E	E	G																			
Glyphosate[4,5]	120	E	E	E	E	F	E	E	E	F	G	E	E		F	E	E	E	E	G	E	E	E	E	E	E	F	F
Glyphosate (preharvest)	120					G									G[6]												F	G
Hoe-Grass 284	133	G	G	G	G				G																			
Liberty[1]	144	G	G	G		F	F[3]	G[3]	G	G		G	G		F	G	G	G	G	G	G	G	G	G	G	G	G	F
Lontrel	149	G								G																	F	G
Muster Gold II	156	G	G	E		F	E	E	G							G	G				G	P			G	F		
Muster Toss-N-Go	158	G														G	G				G	P			G	F		
Odyssey[2]	159	G	G	E			G	G	G	F		E	E			E	G	F	P		E	E	E	E	G	E		
Poast Ultra	165	E	E	E	E	F	E	E	G																			
Pursuit[2]	176	E		G			P	P	F	G		G	G						P		E	G			G	E		
Pursuit Ultra[2]	177	E	E	E	E	F	E	E	G	F		G	G				F				E	G			F	G		
Select	188	E	E	E	E	F	E	E	G																			
Trifluralin	204	E	G	G	G				F	F		G							G			G	G					
Venture	221	E	E	F	F	F	E	E	G																			

[1] For use **only** on Liberty Link varieties. [2] For use **only** on CLEARFIELD canola varieties. [3] Ratings based on 1.3 L/acre rate of Liberty. Control may be reduced at lower rates. [4] For use **only** on Roundup Ready canola varieties. [5] Not registered for control with all products. See glyphosate sections for details. [6] Season long control.
• Registered for control, ratings not yet developed. S – Suppression.

Table 11. Weed Control in Potatoes

HERBICIDE	PAGE	Barnyard Grass	Foxtail, Green and Yellow	Volunteer Tolerant Canola	Volunteer Corn	Volunteer Barley	Volunteer Wheat	Wild Oats	Quackgrass	Chickweed	Dandelion	Hemp Nettle	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Pigweed, Prostrate	Purslane	Smartweed (Annual)	Shepherd's-purse	Stinkweed	Volunteer Canola
Dual II* +	91	•	•												S						
Eptam 8-E* +	99	•	•			•	•	•	S	•			•		•	•	•				
Glyphosate (preplant use only)* +	120		•	•	•	•	•	•	•		•	•	•	•	•			•	•	•	
Hoe-Grass 284 +	133	•	•		•			•													
Liberty (dessicant only)	144																				
Linuron (pre-emergent use only) +	146	S	•							•			•		•		•	•	•	•	
Poast Ultra* +	165	•	•		•	•	•	•	S												
Prism* +	172	•	•						•				S		•						
Reglone Desiccant* +	182																				
Select* +	188	•	•		•	•	•	•													
Sencor* +	190									•		•	•	•	•			•	•	•	•
Venture	221	•	•		•	•	•	•	S												

• Controlled S – Suppression
* Approved for use by Midwest Food Products
+ Approved for use by McCains

Table 12. Weed Control in Sunflowers

HERBICIDE	PAGE	Crop Tolerance	Barnyard Grass	Foxtail, Green and Yellow	Quackgrass	Volunteer Barley	Volunteer Wheat	Wild Oats	Buckwheat, Wild	Catchfly, Night-flowering	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mallow, Round-leaved	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada
Assert	64	F																		G				G		
Edge	97	G	E	E		P	F	G	G		G	P				P	G	E			E	P	P			
Eptam 8E	99	G	G	G		F	F	G			G							G			G					
Hoe-Grass 284	133	G	G	G				G																		
Poast Ultra	165	E	E	E				G																		
Select	188	E	E	E	F	E	E	G																		
Trifluralin	204	E	G	G				F	F		G							G			G	G				
Venture	221	E	E	F	F	E	E	G																		

Table 13. Weed Control in Special Crops

		CROP						ANNUAL WEEDS																								PERENNIALS			
HERBICIDE	PAGE	Canaryseed	Safflower	Caraway	Coriander	Buckwheat	Mustard	Barnyard Grass	Foxtail, Green	Foxtail, Yellow	Volunteer Wheat	Wild Oat	Buckwheat, wild	Catchfly, night-flowering	Chickweed	Cleavers	Cocklebur	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Russian Thistle	Shepherd's Purse	Smartweed, Annual Species	Stinkweed	Volunteer Barley	Volunteer Flax	Volunteer Mustard, Canola	Canada Thistle	Dandelion	Perennial Sow-thistle	Quackgrass
Accord	54	✓						G	E							E													G					
Avadex BW	70	✓[1]					✓					G																						
Avenge	74	✓										G																						
Banvel II + MCPA	76	✓											G			G	G	E	F		E	E	G	G	E	G	E		P	G	F	P	F	
Buctril M/Mextrol	82	✓											E	F			G	G		G	E	E	G	G	G	G	G			G	P		P	
Edge	97		✓	✓	✓		✓[2]	E	E	E	F	G	G		G	P			P	G	E		G	P		P		P						
Fortress	110						✓		G	G		G	P							P	P			P	P									
Fusion	118						✓	G	E			G																						
Hoe-Grass 284	133					✓	✓	G	G	G		G																						
Linuron (Afolan F only)	146			✓	✓																	•												
Muster Toss-n-Go	158						✓[3]											G	G			G				G	F							
Pardner/Koril	160	✓											G				F			F	G	F	F	G		G	F							
Poast Ultra	165		✓	✓	✓	✓		E	E	E	E	G																E						F
Select	188						✓	E	E	E	E	G																E						F
Stampede EDF	196	✓							G																									
Target	199	✓											G	G		G		E	F	G	E	E	G	G	E	G	E				F		F	
Trifluralin	204		✓				✓	G	G	G		F	F		G						G		G	G										
Venture	221						✓	E	F	F	E	G																E						F

[1] Granular formulation only. [2] Yellow mustard only. [3] Brown and oriental only.

Table 14a. Herbicides for Use Before Seeding or After Seeding but Prior to Crop Emergence

HERBICIDE	RATE L/acre	pre seeding	pre emergent	barley	canaryseed	canola	corn, field	corn, sweet	dry beans	field pea	forage grasses	flax	oats	soybean	wheat	rye
Amitrol	1.7	✓		✓		✓	✓		✓	✓				✓	✓	
glyphosate	0.3-1.0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Glyphosate + Pardner	0.5 + 0.405	✓	✓	✓									✓		✓	
Prepass	40 acres/case	✓		✓									✓		✓	
Roundup + 2,4-D	0.5-0.8 + 0.23-0.58	✓	✓	✓											✓	✓
Roundup + Buctril M	0.5-0.8 + 0.2-0.4	✓		✓	✓		✓	✓			✓	✓	✓		✓	✓
Roundup + MCPA	0.5-0.8 + 0.2-0.28	✓		✓			✓	✓		✓		✓	✓		✓	✓
Roundup + MCPA	0.5-0.8 + 0.2-0.4	✓		✓			✓	✓				✓	✓		✓	✓
Rustler	1.0-1.3	✓		✓			✓						✓		✓	✓

Table 14b. Weed Control Before Seeding or After Seeding but Prior to Crop Emergence

HERBICIDE	RATE L/acre	PAGE	Brome, Downy	Buckwheat, Wild	Dandelion	Flixweed	Foxtail Barley	Foxtail, Green	Hemp-nettle	Kochia	Lady's-thumb	Lamb's-quarters	Mustard, Wild	Narrow-leaved Hawk's Beard	Pigweed, Redroot	Quackgrass	Russian Thistle	Shepherd's Purse	Stinkweed	Volunteer Cereals	Volunteer Canola (including Roundup Ready varieties)	Volunteer Flax	Wild Oats
Amitrol 240	1.7	62			•																		
Glyphosate + Pardner	0.4 + 0.45	160		•				•		•	•	•	•				•		•	•	•		•
Glyphosate	0.3 to 1.5	120	•	•	S	•	S	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•
Prepass	40 acres/case	167	•	•	S	•		•	•	•	•	•	•	•	•		•	•	•	•	•		•
Roundup + 2,4-D	0.5-0.8 + 0.23-0.58	120	•	•		•		•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Roundup + Buctril M	0.5-0.8 + 0.2-0.4	120	•	•		•		•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Roundup + MCPA	0.5-0.8 + 0.2-0.4	120	•	•		•		•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
Rustler	1.0 to 1.3	187	•	•		•		•		•	•	•	•		•		•		•	•			•

• Controlled S – Suppression

Table 15. Weed Control in Summerfallow (Chem Fallow)

HERBICIDE	RATE L/acre	PAGE	Brome, Downy	Buckwheat, Wild	Dandelion	Flixweed	Foxtail Barley	Foxtail, Green	Kochia	Lady's-thumb	Lamb's-quarters	Mustard, Wild	Pigweed, Redroot	Quackgrass	Russian Thistle	Stinkweed	Thistle, Canada	Thistle, Sow (Perennial)	Volunteer Cereals	Volunteer Canola	Wild Oats
Banvel II + 2,4-D	0.12 + 0.45	76		•		•			•	•	•	•	•		•	•	S	S			
DyVel DS	0.71	93		•		•			•	•	•	•	•		•	•	S			•	
Express Pack	40 acres/pack	107				•										•					
Heritage[1]	0.52 to 8.9 kg/acre	204		•				•			•		•		•						•
Lontrel	0.34	149		•													•	S			
Glyphosate	0.5 to 1.0	120	•	•		•	S	•	•	•	•	•	•		•	•			•	•[2]	•
Glyphosate + 2,4-D amine (500 g/L)	0.40 + 0.49	120				•		•	•	•	S	•	•		S	•			•	•	•
Glyphosate + Banvel II	0.40 + 0.12	120		S		•		•	•	•	•	•	S		•	•			•	•[2]	•
Glyphosate + Pardner	0.40 + 0.51	120		•				•	S	•		•	S			•			•	•	S
Rustler	1.0 to 1.3	187	•	•		•	S	•	•	•	•	•	•		•	•			•	•[2]	•
Target/Sword	0.81	199		•		•			•	•	•	•	•		•	•	S	S		•	

• Controlled S – Suppression [1] Not for use in Manitoba. [2] Not including Roundup Ready canola.

Table 16. Fall Weed Control in Stubble

HERBICIDE	PAGE	Flixweed	Narrow-leaved Hawk's Beard	Shepherd's-purse	Stinkweed	Canada Thistle	Quackgrass	Dandelion
2,4-D	47	•		•	•	S		S
Amitrol 240	62					S		
Banvel II	76					S		S
Banvel II + Glyphosate	76	•		•	•	S	S	
DyVel DS	93	•		•	•	S		
Glyphosate	120					S	•	•
MCPA	151	•		•	•	S		S
Target/Sword	199	•		•	•	S		

• Controls fall seedlings less than 2 inches (5 cm) across.
S – Suppression. Levels of suppression vary depending on the product and growing conditions in the fall. Regrowth and in-crop treatments can be expected.

Table 17. Weed Control in Grass Pastures and Hayfields

HERBICIDE	RATE L/acre or kg/acre	PAGE	Absinth	Bindweed, Field	Burdock	Canada Thistle	Dandelion	Dock, Curled	Daisy, English	Flixweed	Foxtail Barley	Gumweed	Hawk's Beard, Narrow-leaved	Knapweed	Leafy Spurge	Nodding Thistle	Poplar	Pussy Toes	Red Bartsia	Sage, Pasture	Sow-thistle, Perennial	Snowberry	Stinkweed	Tansy	Wild Rose	Willow	Wormwood, Biennial
2,4-D (500 g/L)	0.57 - 1.82	47	░	░	•	░	░	•		•		░	░	░	░	░	░	░	•	░	░	░	•				
2,4-DB	0.71 - 1.72	49		░		░		■					■								░		•				
Banvel II	0.85 - 1.86	76		░		░	░	░	░					░	░					░	░			░			
Banvel II + 2,4-D	0.85 + 0.89 - 1.62	76	░	░	•	░	░	░	░	•		░			░	░	░		•	░	░	•	•	░	•	░	
DyCleer ITS NAME CHANGED	0.51 - 3.73	??	░	•		•		░	•					•	░					•	░						
Escort	0.010 - 0.012	102				░	•																				
Grazon	2.8	130			•	•	•	•													░	•		•	■		
Kerb	0.36 - 0.45	140									•																
MCPA (500 g/L)	0.7 - 1.9	151		░		░	░	░		•		░			■						░		•	░			•
MCPB + MCPA	1.11 - 1.72	154		░																	░		•				
Remedy EC	1 - 8	184		■	•		•	•									•								•	•	
Tordon 22K	0.45 - 3.64	202		■		•								•	■					•							

• Controlled. ■ Controlled by the highest rate within this range. ░ Top growth suppression.

Table 18. Weed Control in Shelterbelts

HERBICIDE	PAGE	USE: Before Planting	USE: After Planting (New & Established)	USE: Established	SHELTERBELT SPECIES: American Elm	Birch	Caragana	Crabapple	Green Ash	Juniper	Lilac	Manitoba Maple	Poplar	Scots Pine	Siberian Elm	Willow	WEEDS: Barnyard Grass	Foxtail, Green and Yellow	Wild Oats	Buckwheat, Wild	Chickweed	Cleavers	Cocklebur	Dandelion	Flixweed	Hemp-nettle	Kochia	Lamb's-quarters	Mustard, Wild	Pigweed, Red Root	Quackgrass	Russian Thistle	Shepherd's-purse	Smartweed, Annual Species	Stinkweed	Thistle, Sow (Perennial)	Thistle, Canada
Amitrol 240	62			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Casoron	84		•		•		•	•	•	•	•	•			•	•		•		•	•						•	•	•	•	•		•	•			
Glyphosate	120	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Gramoxone	129		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		•	•	•	•	•	•		•	•	•	•		
Linuron	146			•	•		•		•			•		•	•	•	•	•		•	•						•	•		•				•	•		
Simadex Simazine	193			•	•		•		•			•			•		•	•[1]	•	•								•						•			
Trifluralin Liquids	204	•		•	•		•		•					•	•		•	•	•	•	•							•		•		•					

[1] Yellow foxtail only.

Herbicide Formulations and Companies

Product	*Common Name*	*Formulation*	*Company*
2,4-D	2,4-D	500, 600, 700 g/L SN, EC	Various
Accent	nicosulfuron	75% DF	DuPont
Accord	quinclorac	75% DF	BASF Canada
Achieve 80 DG/Liquid	tralkoxydim	80% DG/400 g/L SC	Syngenta
Achieve Extra Gold	tralkoxydim + bromoxynil + MCPA E	40% DG + 280 g/L + 280 g/L EC	Syngenta
Advance	trifluralin	10% G	Dow AgroSciences
Afolan F	linuron	480 g/L F	Bayer CropScience
Ally Toss-N-Go	metsulfuron methyl	60% DF	DuPont
Amitrol 240	amitrole	240 g/L SN	Nufarm
Assert 300 SC	imazamethabenz	300 g/L SC	BASF Canada
Assure II	quizalofop-p-ethyl	96 g/L EC	DuPont
Atrazine	atrazine	480 g/L F; 90% DG	Syngenta, UAP; Syngenta
Attain	fluroxypyr + 2,4-D E	180g/L + 564 g/L EC	Dow AgroSciences
Avadex BW/MicroActiv	triallate	400 g/L EC, 10% G	Monsanto
Avenge 200-C	difenzoquat	200 g/L SN	BASF Canada
Banvel II	dicamba	480 g/L SN	BASF Canada
Basagran/Basagran Forté	bentazon	480 g/L SN	BASF Canada
Bonanza	trifluralin	400 g/L EC, 10% G	UAP
Buctril M	bromoxynil + MCPA E	280 g/L + 280 g/L EC	Bayer CropScience
Caliber	2,4-DB	400 g/L EC	UAP
Casoron	dichlobenil	4% G	UAP
Champion® Extra	fenoxaprop-p-ethyl thifensulfuron + tribenuron methyl	120 g/L EC 50% DF + 25% DF	DuPont
Champion Plus	fenoxaprop-p-ethyl + MCPA E + 2,4-D E + thifensulfuron methyl	45 g/L + 210 g/L + 70 g/L EC + 75% DF	DuPont
Clovitox Plus	MCPB + MCPA	375 g/L + 25 g/L SN	IPCO
Cobutox 600	2,4-DB	600 g/L EC	IPCO
Compitox	mecoprop	150 g/L SN	Nufarm
Credit	glyphosate	356 g/L SN	Nufarm
Curtail M	clopyralid + MCPA E	50 g/L + 280 g/L EC	Dow AgroSciences
Dichlorprop-D	dichlorprop + 2,4-D E	300 g/L + 282 g/L EC	IPCO
Dual II Magnum	metolachlor	915 g/L EC	Syngenta
DyVel	dicamba + MCPA K	84 g/L + 336 g/L SN	BASF Canada
DyVel DS	dicamba + 2,4-D A + mecoprop	110 g/L + 295 g/L + 80 g/L SN	BASF Canada
Eclipse	glyphosate + clopyralid	360 g/L SN + 360 g/L SN	Dow AgroSciences
Edge	ethalfluralin	5% G	Dow AgroSciences
Embutox 625	2,4-DB	625 g/L EC	Nufarm
Eptam-8E	EPTC	800 g/L EC	Syngenta
Eradicane-8E	EPTC	800 g/L EC	Norac Concepts
Estaprop	dichlorprop + 2,4-D E	300 g/L + 282 g/L EC	Nufarm
Everest	flucarbazone-sodium	70% DG	Bayer cropscience
Express Pack	tribenuron methyl + 2,4-D E	75% DF + 700 g/L EC	DuPont
Factor	glyphosate	356 g/L SN	IPCO
FlaxMax	sethoxydim + clopyralid + MCPA E	450 g/L EC + 50 g/L + 280 g/L EC	BASF Canada
Fortress	triallate + trifluralin	10% + 4% G	Monsanto
Freedom Gold	quizalofop-p-ethyl + thifensulfuron methyl	96 g/L EC + 75% DF	DuPont
Frontier	dimethanamid	900 g/L EC	BASF Canada
Frontline	florasulam + MCPA E	50 g/L SC + 500 g/L EC	Dow AgroSciences
Frontline + 2,4-D	florasulam + 2,4-D E	50 g/L + 564 g/L EC	Dow AgroSciences

Product	*Common Name*	*Formulation*	*Company*
Fusion	fenoxaprop-p-ethyl + fluazifop-p-butyl	80.5 g/L + 125 g/L EC	Bayer CropScience
Glyfos	glyphosate	360 g/L SN	Cheminova
Gramoxone	paraquat	200 g/L SN	Syngenta
Grazon	picloram + 2,4-D E	65 g/L + 240 g/L EC	Dow AgroSciences
Harmony Total	clodinafop propargyl + thifensulfuron methyl + tribenuron methyl	240 g/L EC 50% + 25% DF	DuPont
Heritage	trifluralin	5% G	Dow AgroSciences
Hoe-Grass 284	diclofop methyl	284 g/L EC	Bayer CropScience
Hoe-Grass II	diclofop methyl + bromoxynil	230 g/L + 80 g/L EC	Bayer CropScience
Horizon	clodinafop-propargyl	240 g/L EC	Syngenta
Horizon BTM	clodinofop propargyl + bromoxynil + MCPA E	240 g/L + EC + 280 g/L + 280 g/L EC	Bayer CropScience
Kerb 50W	propyzamide	50% WP	Dow AgroSciences
Koril 235	bromoxynil	235g/L EC	Nufarm
Laddok	bentazon + atrazine	200 g/L + 200 g/L SN	BASF Canada
Laser DF	fenoxaprop-p-ethyl + MCPA E + thifensulfuron methyl	28 g/L + 336 g/L EC + 75% DF	Bayer CropScience
Liberty	glufosinate ammonium	150 g/L SN	Bayer CropScience
Linuron 480	linuron	480 g/L F	UAP
Lontrel	clopyralid	360 g/L SN	Dow AgroSciences
Lorox DF	linuron	50% DF	DuPont
Maverick	glyphosate	356 g/L SN	Dow AgroSciences
MCPA	MCPA	300,400,500,564 g/L SN, EC	Various
Mecoprop	mecoprop	150 g/L SN	UAP
Mextrol 400 M	bromoxynil + MCPA E	200 g/L + 200 g/L EC	Nufarm
Muster Gold II	ethametsulfron methyl + quizalofop-P-ethyl	75% DF + 96 g/L EC	DuPont
Muster Toss-N-Go	ethametsulfuron methyl	75% DF	DuPont
Odyssey	imazamox + imazethapyr	35% + 35% DG	BASF Canada
Pardner	bromoxynil	280 g/L EC	Bayer CropScience
Pea Pack	metribuzin + MCPA Na	75% DG + 300 g/L SN	Bayer cropscience
Pinnacle	thifensulfuron methyl	75% DF	DuPont
Poast Ultra	sethoxydim	450 g/L EC	BASF Canada
PrePass	glyphosate _ florasulam	360 g/L + 50 g/L SC	Dow AgroSciences
Prestige	fluroxypyr + clopyralid + MCPA E	180 g/L + 50 g/L + 280 g/L EC	Dow AgroSciences
Prevail	tralkoxydim + clopyralid + MCPA E	80% DG + 50 g/L + 280 g/L EC	Dow AgroSciences
Primextra II Magnum	metolachlor + atrazine	330 g/L + 170 g/L F	Syngenta
Princep Nine T	simazine	90% DG	Syngenta
Prism	rimsulfuron	25% DF	DuPont
Puma™ Super	fenoxaprop-p-ethyl	120 g/L EC	Bayer CropScience
Pursuit	imazethapyr	240 g/L SN	BASF Canada
Pursuit Ultra	sethoxydim + imazethapyr	450 g/L EC + 240 g/L SN	BASF Canada
Refine Extra Toss-N-Go	thifensulfuron methyl + tribenuron methyl	50% + 25% DF	DuPont
Reglone Desiccant	diquat	240 g/L SN	Syngenta
Remedy	triclopyr	480 g/L EC	Dow AgroSciences
Renegade	glyphosate	356 g/L SN	Monsanto
Rival	trifluralin	60% DF, 500 g/L EC, 10% G	Bayer CropScience
Roundup Original/Transorb	glyphosate	356-360 g/L SN	Monsanto
Rustler	glyphosate + dicamba	132 g/L + 60 g/L SN	Monsanto
Select	clethodim	240 g/L EC	Bayer CropScience
Sencor	metribuzin	75% DF, 75% DG, 500 g/L F	Bayer cropscience
Simadex Simazine 500	simazine	500 g/L F	UAP
Spectrum	florasulam + clopyralid + MCPA E	50 g/L SC + 50 g/L + 280 g/L EC	Dow AgroSciences
Stampede EDF	propanil	80% DF	Dow AgroSciences
Sundance	sulfosulfuron	75% DG	Monsanto
Sword	dicamba + mecoprop + MCPA A	62.5 g/L + 62.5 g/L + 275 g/L SN	UAP
Target	dicamba + mecoprop + MCPA A	62.5 g/L + 62.5 g/L + 275 g/L SN	Syngenta
Thumper	bromoxynil + 2,4-D E	280 g/L + 280 g/L EC	Bayer CropScience
Tordon 22K	picloram	240 g/L SN	Dow AgroSciences
Touchdown 600	glyphosate	413 g/L SN	Syngenta
Touchdown IQ	glyphosate	356 g/L SN	Syngenta
Treflan	trifluralin	480 g/L EC, 5% G	Dow AgroSciences
Triumph Plus	fenoxaprop-p-ethyl + MCPA E + thifensulfuron methyl	56 g/L EC + 256 g/L EC + 75% DF	Bayer CropScience
Trophy	fluroxypyr + MCPA E	180 g/L + 500 g/L EC	Nufarm
Tropotox Plus	MCPB + MCPA A	400 g/L SN	Nufarm
Turboprop	dichlorprop + 2,4-D E	300 g/L + 282 g/L EC	UAP
Ultim	nicosulfuron + rimsulfuron	37.5% + 37.5% WDG	DuPont
Unity	bromoxynil + triasulfuron	280 g/L EC + 75% WG	Bayer CropScience
Vantage/Vantage Plus	glyphosate	356-360 g/L SN	Dow AgroSciences
Velpar DF	hexazinone	75% DF	DuPont
Venture	fluazifop-p-butyl	125 g/L EC	Syngenta
Victor	glyphosate	356 g/L SN	Inter Ag/Bayer CropScience

Abbreviations

WP	wettable powder
DG	water dispersible granule
WSG	water soluble granule
EC	emulsifiable concentrate
G	granule
SC	suspension concentrate
WSP	water soluble powder
DF	dry flowable
SN	solution
F	flowable
A	amine
E	ester

Products Available as Prepackaged Tank Mixes

Product Name (Manufacturer)	Component 1 or A	Component 2 or B	Component 3 or C	Crops	Weeds Controlled	Area Treated	Cost per acre (2002)
Absolute (BASF Canada)	Odyssey	Lontrel	Merge (adjuvant)	CLEARFIELD canola	See component products	40 acres or 16 ha	$32.99
Achieve Extra Gold (Syngenta)	Achieve 40DG	Buctril M	Turbocharge (adjuvant)	Wheat (spring, durum, winter), barley,	See the weeds of the component products plus tame buckwheat	20 acres or 8 ha	$22.15
Champion(2) Extra (DuPont Canada Inc.)	Refine Extra	Puma(2) Super		Barley	See component products	40 acres or 16 ha	$21.80
Eclipse (Dow AgroSciences)	Lontrel (Eclipse A)	Vantage (Eclipse B)		Roundup Ready Canola varieties	See component products	30 acres	$15.90
FlaxMax (BASF Canada)	Curtail F*	Poast Ultra	Merge (adjuvant)	Flax	See component products	18-23 acres or 7.2-9.3 ha	$19.28 to $26.03
Harmony Total (DuPont Canada Inc.)	Refine Extra	Horizon	Score (adjuvant)	Spring wheat (including durum)	Weeds controlled by Refine Extra plus wild oat, green foxtail	40 acres or 16 ha	$21.78
Horizon BTM (Syngenta)	Buctril M	Horizon	Score (adjuvant)	Spring wheat (including durum)	Weeds controlled by Buctril M plus wild oat.	20 acres or 8 ha	$22.50
K2 (DuPont Canada Inc.)	Refine Extra	Everest	Add 2,4-D amine and a non-ionic surfactant	Spring wheat (NOT durum)	See component products	40 acres or 16 ha	$20.24 plus 2,4-D, surfactant
Muster Gold II (DuPont Canada Inc.)	Muster	Assure II	Sure-Mix or Merge (adjuvant)	Canola, including herbicide tolerant canola	See component products	40 acres or 16 ha	$20.55
Pea Pack (Bayer cropscience)	Sencor	MCPA sodium salt		Pea	Lamb's-quarters, stinkweed, wild mustard, redroot pigweed, volunteer canola	40 acres or 16 ha	$5.95
Prevail (Dow AgroSciences)	Achieve 80DG	Curtail M	Turbocharge (adjuvant)	Spring wheat (including durum), barley	Wild oat, green foxtail, persian darnel; weeds controlled by Curtail M, plus Russian thistle	20 acres or 8 ha	$25.50
Pursuit Ultra (BASF Canada)	Poast Ultra	Pursuit	Merge (adjuvant)	Field pea, CLEARFIELD canola varieties	See Poast Ultra plus Pursuit tank mix	40 acres or 16 ha	$26.07

**Not recommended for use on flax by itself.*

Note: *See the component products listed for information concerning staging, application information, safety precautions, the effect of weather and grazing, recropping, havest interval and storage precautions. The more stringent recommendation of the two products should be followed. Mix products in the order listed.*

Herbicide Directory

2,4-D

Herbicide Group – 4
(Refer to page 27)

Company:

Various. Application details may differ with different product labels. Consult specific product labels for more information.

Formulations:

500 g/L or 600 g/L 2,4-D amine formulated as a solution; 600 g/L, or 700 g/L 2,4-DLV ester formulated as an emulsifiable concentrate.

Container sizes - various

Crops, Rates and Staging:

Application rates for individual products may vary from those listed. Refer to the label for product specific use rates. Rates greater than those listed may cause crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

CROP	MAXIMUM SAFE RATE (L/ACRE)	STAGE
Wheat, barley, spring rye	0.45 (500 g/L) 0.38 (600 g/L) 0.32 (700 g/L)	4 leaf to early flag leaf
Fall rye, winter wheat	0.45 (500 g/L) 0.38 (600 g/L) 0.32 (700 g/L)	In spring, apply after winter cereals begin grow but before emergence of the flag leaf. Winter wheat only may be treated in the fall for winter annual weed control if wheat is in the tillering phase of growth *(caution: this use not registered and is at the risk of the user).*
Corn	0.42 (500 g/L) 0.35 (600 g/L)	Apply as an overall spray before corn is 6 inches (15 cm) tall and before the 6-leaf stage. After 6 inches (15 cm) use a directed spray.
Seedling and established grasses for forage and seed production*	0.45 (500 g/L) 0.38 (600 g/L) 0.32 (700 g/L)	Apply from the 3 leaf stage to emergence of the flag leaf of seedling grasses. For established grasses for seed production, apply in spring up to emergence of the flag leaf.
Established forage grass *(not for seed production)**	0.93 (500 g/L) 0.78 (600 g/L) 0.67 (700 g/L)	Apply in spring up to emergence of the flag leaf of established grasses, or in the fall after harvest.
Established grass pastures	1.81 (500 g/L) 1.51 (600 g/L) 1.30 (700 g/L)	No restrictions, apply when weeds are actively growing. For control of brush species, apply at time of rapid growth (usually May to mid-June, and September prior to colour change).
Turf	0.91 (500 g/L) 0.76 (600 g/L)	Apply in spring and early September on established turf. Do not use on bent grasses.
Fall stubble – Canada thistle suppression	0.91 (500 g/L) 0.76 (600 g/L) 0.65 (700 g/L)	Canada thistle (suppression only) - Apply when thistle plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth. Regrowth will be present the following spring and in-crop treatments will be required.

* Note: Registered for use only with certain brands of 2,4-D; use of non-registered products is at the risk of the user.

Weeds, Rates and Staging:

Apply at lower rates when weeds are small (2 to 4 leaf stage) and actively growing. Higher rates are needed when weeds are larger, in heavy populations, or growing under stressful conditions (excessively cold, hot, dry or wet). Lower rates may be applied in late fall to control winter annual weeds.

Susceptible Weeds:
0.27 to 0.45 L/acre (500 g/L)
0.22 to 0.38 L/acre (600 g/L)
0.19 to 0.32 L/acre (700 g/L)

Bluebur
Burdock
Cocklebur
False Flax
Flixweed (Late fall application or spring seedlings)
Goat's-beard
Kochia
Lamb's-quarters
Mustards (except dog and tansy mustard)
Narrow-leaved hawk's-beard (Late fall application or spring seedlings)
Plantain
Prickly lettuce
Ragweed
Russian pigweed
Russian thistle
Shepherd's-purse**
Stinging nettle
Stinkweed**
Sweet Clover
Thyme-leaved spurge
Volunteer canola (including all herbicide tolerant varieties)
Wild Radish
Wild Sunflower

Harder to kill weeds:
0.48 to 0.74 L/acre (500 g/L)
0.40 to 0.61 L/acre (600 g/L)
0.34 to 0.53 L/acre (700 g/L)

Blue lettuce*
Burdock (top growth only of bolting plants)
Canada thistle***
Common chickweed
Common groundsel**
Common peppergrass
Dandelion*
Flixweed (spring prior to bolting)
Knotweed
Lady's-thumb
Leafy spurge*
Mustard (Dog & Tansy)
Narrow-leaved Hawk's-beard (spring prior to bolting)
Oak-leaved goosefoot
Pineappleweed
Prostrate pigweed
Redroot pigweed
Russian thistle
Sheep sorrel
Tumble pigweed

Top Growth Control only (at rates for harder to kill weeds)

Biennial wormwood
Bull thistle
Buttercup
Curled dock
Field bindweed
Gumweed
Hedge bindweed
Hoary cress
Horsetail
Mouse-eared chickweed
Perennial Sow-thistle
Russian knapweed
Tartary buckwheat

* Control of seedlings at rates given above and top growth control only of established plants.

** Spring seedlings. Winter annual weeds - apply in late fall or early spring prior to bolting.

*** Suppression only - Apply when Canada thistle plants are actively growing and have 6 to 8 inches (15 to 20 cm) of new growth. Regrowth will be present the following spring and in-crop treatments will be required.

Cost: (2002 suggested retail prices):

Amine 500 g/L - $5.80/L
Amine 600 g/L - $6.85/L
LV Ester 600 g/L - $7.35/L
LV Ester 700 g/L - $8.55/L

Formulation Characteristics:

Formulation	Risk of Vapour Drift	Activity on Weeds	Risk of Crop Injury
LV Ester	Medium	Fast	Medium
Amine	Very Low	Medium	Low

Application Information:

Water Volume: 10 gallons/acre (45 L/acre) - ground application.

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Best weed control occurs when temperatures are above 21°C (daytime) or 10°C (nighttime) and humidity is above 70 percent. Do not apply if temperature exceeds 27°C.

Tank Mixes:

Mixes listed may not occur on all products. Check individual products for registered mixes.

Note: Following list is for mixes listed on 2,4-D labels only. For additional mixes see the blue fold out chart inside the back cover.

Herbicides:

Spring wheat (including durum), winter wheat and Barley:
Avenge (ester)
Banvel (amine)

Spring wheat (including durum), and Barley:
Pardner and Sencor (amine only)
Assert, Express DF, Refine Extra* and Ally* (ester only)
* The addition of a non-ionic surfactant is required.

Fertilizers: None

Insecticides: None

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: 2,4-D amine - within 4 hours will reduce control. 2,4-D LV ester - within 2 hours will reduce control.

Grazing: Do not permit lactating dairy animals to graze fields within 7 days of application. Do not harvest forage or cut for hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.
Recropping: No restrictions the year after treatment.

Aerial Application: Some formulations may be applied by air. Check the label for detailed instructions.

Storage: 2,4-D LV ester may be frozen. 2,4-D amine requires heated storage.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison

2,4-DB

Herbicide Group – 4

(Refer to page 27)

Company/Products:

Interprovincial Co-op (Cobutox 600)
Nufarm (Embutox 625)
United Agri Products (Caliber 400)

Formulations:

Cobutox 600: 600 g/L 2,4-DB formulated as an emulsifiable concentrate. Container size - 10 L.

Embutox 625: 625 g/L 2,4-DB formulated as an emulsifiable concentrate. Container size - 10 L.

Caliber 400: 400 g/L 2,4-DB formulated as an emulsifiable concentrate. Container size - 10 L.

Crops and Staging:

NOTE - When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

CROP	STAGE
Seedling alfalfa, bird's-foot trefoil*	1 to 4 trifoliate leaf stage
Clover (alsike, red, white, Dutch but NOT Sweet clover)*	As soon as possible after emergence of the 1st trifoliate leaf
Wheat, barley or oats (when used as a cover crop)	5 leaf to emergence of the flag leaf
Field corn	15 inches (38 cm) to prior to tassling.
Pastures containing forage legumes	After cutting or grazing and regrowth less than 3 inches (7.5 cm)

*with or without a cereal cover crop.

Seedling Forage Grasses*:

Apply from 2 to 4 leaf stage of:

Bromegrass (smooth)
Fescue (creeping red, meadow, tall)
Orchard grass
Timothy
Wheatgrass (crested, intermediate, streambank, tall)

* Not for seed production. Not for feeding in the establishment year.

Weeds and Staging:

Weeds controlled from the 2 to 4 leaf stage at lower recommended rates include:

Ball mustard
Lamb's-quarters
Ragweed
Redroot pigweed
Shepherd's-purse
Stinkweed
Wild mustard
Wormseed mustard

Weeds controlled at higher recommended rates include:

WEED	STAGE
Bull thistle	Rosette
Canada thistle*	6 in. (15 cm) to early bud
Chicory	Rosette
Curled dock**	Young and actively growing
Dandelion*	Prior to bud
Field bindweed*	Late summer
Green smartweed**	Seedlings
Horsetail*	4 to 5 inches (10 to 13 cm)
Narrow-leaved hawk's- beard	Apply at rosette stage after alfalfa has gone dormant
Oak-leaved goosefoot	Up to 2 leaf stage
Perennial sow-thistle*	Rosette
Lady's-thumb**	Seedlings
Plantain	Prior to flowering
Wild buckwheat	Up to 2 leaf stage
Yellow rocket	Late September to mid-October

* Top growth control
** Suppression
Refer to individual product labels for details on application rates to use for different weed species.

Cost: (2002 suggested retail prices):

Caliber - $11.75/L
Cobutox - $19.80/L
Embutox - $19.55/L

Rates:

When applying to seedling forage legumes and grasses:

HERBICIDE	RATE (L/ACRE)	ACRES TREATED PER CONTAINER
Cobutox 600	0.73 - 0.93	13.7 - 10.8
Embutox 625	0.71 - 0.91	14.1 - 11.0
Caliber 400	1.1 - 1.4	9.0 - 7.0

When applying to corn and to pastures containing forage legumes:

HERBICIDE	RATE (L/ACRE)	ACRES TREATED PER CONTAINER
Cobutox 600	0.73 - 1.13	13.7 - 8.8
Embutox 625	0.71 - 1.11	14.1 - 9.0
Caliber 400	1.11 - 1.72	9.0 - 5.8

Application Information:

Water Volume: 15 to 20 gallons/acre (70 to 90 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Severe damage to legumes can occur if high temperatures (more than 27°C) or high humidity prevail at the time of application. Do not apply under dry soil/drought conditions.

Tank Mixes:

Herbicides:

Underseeded Legumes: Cobutox (0.53 L/acre), or Caliber 400 (0.81 L/acre), plus MCPA amine (500 g/L) at 0.028 L/acre or Embutox 625 (0.51 L/acre) plus MCPA sodium salt (300 g/L) at 0.047 L/acre. This tank mix may increase crop damage (stunting). Follow all precautions and restrictions on both product labels.

Fertilizers: None.

Insecticides: None.

Note: The above mixes are those listed on 2,4-DB labels only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Do not graze or cut for feed for 30 days after applying Embutox or Cobutox. Do not graze treated crop or cut for feed in year of treatment after using Caliber.

Recropping: No restrictions the year after application.

Aerial Application: No restriction on label. Reduced water volumes used with aerial applications will lead to increased injury to forage legumes.

Storage: Do not freeze Caliber 400.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Danger Poison (Cobutox 600)

Caution Poison (Embutox 625)

Warning Poison (Caliber 400)

Absolute

Herbicide Group – 2,4

(Refer to page 27)

Company:

BASF Canada

Formulation:

Odyssey: 35 percent imazamox and 35 percent imazethapyr formulated as a dispersible granule, Container size – 4 x 86.5 g water soluble bags per jug – two jugs per case.

Lontrel: 360 g/L clopyralid formulated as a solution. Container size – 2 x 3.4 L jugs.

Each case contains one 8.1 L jug of Merge.

Crops and Staging:

CLEARFIELD canola varieties from the 2 to 6 leaf stage. Apply **only** to CLEARFIELD canola varieties; application to any other variety of canola or **any** other crop will result in crop death.

Weeds and Staging:

Grasses:

Apply from 1 to 4 main stem leaves, until tillers are visible.

Barnyard grass
Green foxtail
Persian Darnel
Volunteer cereals (wheat, barley, oats)
Wild oats

Broadleaves:

Unless otherwise indicated, apply to broadleaf weeds up to 4-leaf stage.

Alsike clover
Canada thistle (rosette to pre-bud stage)*
Chickweed
Cleavers (up to 4 whorls)
Common groundsel
Flixweed
Hemp-nettle
Kochia
Lamb's-quarters**
Perennial Sow-thistle*
Redroot pigweed
Russian thistle
Scentless chamomile
Shepherd's-purse
Smartweed
Stinkweed
Stork's-bill
Tufted vetch
Volunteer alfalfa
Volunteer canola (non-CLEARFIELD varieties)
Volunteer tame mustard
Wild buckwheat
Wild Mustard

* top growth control for 6-8 weeks
**suppression

Cost (2002 suggested retail price):

$32.99/acre

Rate:

Odyssey: 17.3 g/acre
Lontrel: 0.17 L/acre
Merge: 0.5 L per 100 L of spray solution
One case treats 40 acres.

Do not apply more than once per year.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan nozzles calibrated for 20-40 psi. Use a 50 mesh or coarser screen and filter system.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crops may be more susceptible to injury and weed control may be reduced when plants are under stress. Plants are under stress when environmental conditions cause them to cease actively growing before during or after application. These conditions can include very hot or cool temperatures, very wet or dry conditions, or attack by disease.

Tank Mixes:

Herbicides: None registered

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for feed prior to crop maturity

Pre-harvest Interval: Do not apply within 60 days of harvest.

Recropping: The following crops may be grown safely the year following an application:

CLEARFIELD canola, spring wheat and durum wheat. In the event of a crop failure during the year of application, only CLEARFIELD canola should be grown. Conduct a field bioassay the year before growing any other crop than those listed above.

Aerial Application: Do not apply by air.

Storage: Do not freeze. Store in a cool, dry place above 5°C.

Environment: Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 14 m between the outside boundary of the sprayed area and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Eye Irritant

Accent*

Herbicide Group – 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

75 percent nicosulfuron formulated as a water dispersible granule.
Container size - 133.6 g (4 x 33.4 g water soluble bags).

Crops and Staging:*

Field Corn - 1 to 8 leaf stage (six visible collars), coleoptile (short, blunt leaf) is counted as the first leaf.
*Since this use is registered under minor use application, the manufacturer assumes no responsibility for herbicide performance. Users of this product do so at their own risk.

Weeds and Staging:

WEEDS	STAGING
Barnyard grass, fall panicum, green foxtail, yellow foxtail*, old witchgrass	1-6 leaves (up to 2 tillers)
Quackgrass	3-6 leaves (with extended leaf 4-8 inches (10 to 20 cm) long)
Wild oats	3-6 leaves

* suppression only

The most benefit is gained by applying at the earlier end of the leaf stage ranges.

Cost (2002 suggested retail price):

$24.07/acre.

Rates:

Apply Accent at 13.5 g/acre. Add non-ionic surfactant (Citowett Plus, Agsurf or Agral 90) at 0.2 L per 100 L of spray solution.

One bag of Accent will treat 2.5 acres (1 ha).

One container will treat 10 acres (4 ha).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Minimum 10 gal/acre (45 L/acre); optimum 12.5 to 17 gal/acre (57 to 77 L/acre)

Pressure: 25 to 40 psi (175 to 275 kPa).

Nozzles: Flat fan nozzles tilted forward at a 45° angle. Screens of 50 mesh or larger are recommended.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Poor weed control or crop injury may result if at the time of application, plants are under stress from disease, insect or nematode injury, carryover of herbicide from a previous years application, abnormally hot or cold weather, drought, water-soaked soils, hail damage or frost. Delay application until stress passes and both corn and weeds have resumed growth. When corn is injured by frost, wait 48-72 hours after normal growing conditions have resumed before applying Accent. Stress conditions after application may also result in injury or poor weed control.

Tank Mixes:

Herbicides: See blue chart inside back cover for registered tank mixes.

Fertilizers: Do not mix with fertilizers.

Insecticides: None registered. Accent should not be applied to corn that has been treated with Counter, Cygard, Thimet, or Di-Syston. Application of Accent to corn treated with Dyfonate may result in temporary yellowing or stunting of crop. Leave seven days between the application of Accent and that of a foliar organophosphorous insecticide.

Restrictions:

Rainfall: Within 2-4 hours of application may result in reduced weed control.

Grazing: Do not graze treated crops or cut for hay.

Preharvest Interval: Do not apply within 30 days of harvest.

Recropping: Corn and spring cereals may be seeded the year following Accent application. For all other crops, a field bioassay is recommended before planting.

Aerial Application: Do not apply by air.

Storage: Store product in original containers in a secure, dry area, away from other pesticides, food or feed.

Environment: Leave a 5 m buffer between the last spray path and woodlots or shelterbelts. Leave a 22 m buffer before wetland areas or water bodies.

Tank Cleaning:

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill the tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water. If the spray equipment is to be used to spray crops other than corn, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water. Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

For additional information, refer to page 14.

Hazard Rating:

KEEP OUT OF REACH OF CHILDREN.
Caution Eye Irritant

Avoid breathing spray mist.
Avoid contact with skin, eyes and clothing.

Accord*

Herbicide Group – 4

(Refer to page 27)

Company:

BASF Canada

***Accord is no longer being manufactured. This page will remain until supplies are exhausted.**

Formulation:

75 percent quinclorac formulated as a dry flowable. Container size - 2 x 1.1 kg bags of Accord and 2 x 8.1 L jugs of Merge.

Crops and Staging:

Spring wheat (including durum) - 1 to 5 leaf.

Barley* (feed only, not to be used for malting barley) - 1 to 4 leaf (prior to tillering)

Canaryseed** - 3 to 5 leaf

* At the time of publishing, a restriction on barley treated with Accord from entering the USA is in place. Check with BASF Canada and your potential buyers before using Accord on barley destined for the USA.

** Not to be used for human consumption or livestock feed.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Barnyard grass - 1 to 5 leaf.

Cleavers - 1 to 3 whorls.

Green foxtail - 1 to 5 leaf, maximum 2 tillers.

Volunteer flax - 0.5 to 3 inches (1 to 8 cm).

Early treatment of weeds is important to maximize crop yield potential by eliminating early weed competition. Refer to page or label of broadleaf tank mix partner for additional timing restrictions.

Cost (2002 suggested retail price):

$7.60 to $9.21/acre.

Rate:

54 to 68 g/acre (40 to 33 acres/case). Apply with Merge at 1 L per 100 L of spray solution. Use the high rate for heavy infestations of green foxtail. Guidelines for weed densities at light or heavy infestations are not provided on the product label. When in doubt as to the infestation level, use the high rate or contact your local BASF technical representative.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 to 60 psi (275 to 425 kPa).

Nozzles: Standard flat fan nozzles tilted forward 45 degrees. Use 50 mesh strainers and screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply to crop that is under stress from conditions such as frost, hail, flooding, drought or extremes in temperature.

Tank Mixes:

Herbicides: When mixing with broadleaf partners a slight reduction in green foxtail control may result. If spraying for green foxtail, use the high rate of Accord.

In spring wheat and barley:
Buctril M (0.40 L/acre)
MCPA amine or ester - 500 g/L formulations (0.34 to 0.45 L/acre
Refine Extra (8 g/acre

In spring wheat only:
2,4-D amine or ester - 500 g/L formulations (0.34 to 0.45 L/acre)
Avenge 200 C (1.42 L/acre)*
Express Pack (4 g/acre Express + 0.253 L/acre 2,4-D ester)

In Canaryseed: None Registered

* Apply to spring wheat varieties listed on Avenge 200C label only. The Accord/Avenge 200 C tank mix can also be mixed with Buctril M, 2,4-D ester, MCPA ester or Refine Extra at the rates listed above.

To improve green foxtail control, use the high rate of Accord. Add Merge at 1 L per 100 L spray solution for all tank mixes. Refer to individual product labels for application details such as staging and varietal restrictions.

Fertilizers: None registered.

Insecticides: None registered.

Allow 4 days between the application of Accord and any other chemical not listed as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours may reduce control.

Grazing: Do not graze or cut for feed within 77 days of application.

Preharvest Interval: Do not apply within 77 days of harvest for wheat or within 80 days of harvest for spring barley.

Recropping: Wheat, barley, canola, field peas and sunflowers may be grown the year after application. Flax and lentils may be grown the second year after an Accord application. On low organic matter soils or under dry conditions, flax and lentils should not be grown until the third year after application. Do not use Accord on land where potatoes or vegetables are grown. In case of crop failure, only spring wheat (including durum) may be reseeded the same year as an Accord application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above.

Aerial Application: Do not apply by air.

Storage: May be frozen. Should product freeze, warm to room temperature before using.

Environment: Avoid drift onto non-target plants. Leave a buffer of 10 meters from water bodies and wetland areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Caution Eye and Skin Irritant

Achieve 80 DG / Achieve Liquid

Herbicide Group – 1
(Refer to page 27)

Company:

Syngenta

Formulation:

Achieve 80 DG: 80 percent tralkoxydim formulated as a dispersible grain.
Container size - 2 x 2 kg plus 8 L of Turbocharge adjuvant.

Achieve Liquid: 400 g / L tralkoxydim formulated as a suspension concentrate.
Container size – 2 x 4 L plus 8 L of Turbocharge adjuvant.

Crops and Staging:

Unless otherwise indicated there are no staging restrictions.

Cereal crops:
Spring wheat (including durum), winter wheat, barley, triticale, rye (spring and fall)
May be used on wheat and barley crops undersown to forage legumes (if not tank mixed with a broadleaf herbicide).

Seedling or established grasses for seed production (Achieve 80 DG only):
Crested wheatgrass
Intermediate wheatgrass
Timothy (5 to 6 leaf stage)
Creeping red fescue
Meadow bromegrass
Smooth bromegrass
Do NOT apply to Timothy sown with a cover crop.

Grasses for forage production, in the year of establishment (Achieve 80 DG only):
Northern wheatgrass
Slender wheatgrass
Western wheatgrass

Established grasses for forage production (Achieve 80 DG only):
Timothy - 5 to 6 leaf stage in the spring. Applications before this stage will result in crop injury and reduction in forage yield.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Wild oats - 1 to 6 leaf stage (total leaves including tillers), with a maximum of 2 tillers.

Volunteer tame oats - 1 to 6 leaf stage.

Green and yellow foxtail - 1 to 5 leaf stage (total leaves including tillers), with a maximum of 1 tiller.

Barnyard grass, Persian darnel, - 1 to 4 leaf stage (tot leaves including tillers).

Apply at the 2 to 3 leaf stage for optimum contro Optimum weed control and yield response occurs whe weeds are removed before tillering.

Cost (2002 suggested retail price):

Achieve 80 DG – $16.15/acre.
Achieve Liquid – Not available.

Rates:

Achieve 80 DG – 0.10 kg/acre. One case treats 40 acres.

Achieve liquid – 0.2 L/acre. One case treats 40 acre Add Turbocharge at a rate of 0.5 L per 100 L spray solutio Add ammonium sulfate at 7.5 to 15 lb/100 gallons wate (0.75 to 1.5 kg/100 L water) when water analysis show bicarbonate levels are 400 ppm or greater.

Refer to the product label for complete mixing instruction A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 5 to 10 gallons/acre (23 to 45 L/acre). Us 10 gallons/acre (45 L/acre) when applying to timoth (Achieve 80 DG only). Application in less than gallons/acre (23 L/acre) water volume may result in mi ing problems or unacceptable crop injury.

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° flat fan nozzles. All strainer and noz zle screens must be 50 mesh or coarser.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Cereal crops that have set tillers may incur injury (yellow ing and/or stunting) if applications are made within 4 hours of freezing temperatures. Cereal crops that have no set tillers may be injured if exposed to temperatures of 4° or less up to 48 hours before or after application. Tank mi ing with a broadleaf weed herbicide under advers conditions may increase severity of crop injury. Crop under stress from foliar diseases or low fertility are mor susceptible to injury from application. Temporary crop injury may occur when Achieve tank mixes (particularly Estaprop, Turboprop, Dichlorprop D, and Buctril M + MCPA) are applied under extreme environmental conditions (dry or wet, cool or hot weather) resulting in crop stress. Control of grasses could be reduced when they are stressed due to drought, heat, lack of fertility, flooding or prolonged cool temperatures.

Tank Mixes:

For all tank mixes with Achieve, add Turbocharge at a rate of 0.5 L per 100 L of spray solution.

Herbicides:

Do NOT tank mix Achieve products with a broadleaf herbicide when applying to underseeded forage grasses or legumes, except for a 2,4-DB tank mix on underseeded alfalfa (Achieve 80 DG only).

In wheat and barley only:

2,4-DB (0.81 L/acre - 625 g/L formulations)- Achieve 80 DG only
2,4-D ester (0.38 L/acre - 600 g/L formulations)
Attain (40 acres per case)**
Buctril M (0.40 L/acre)*
Curtail M (0.81 L/acre)
Dichlorprop + 2,4-D (0.71 L/acre)
Lontrel (0.11 L/acre) + MCPA ester (0.45 L/acre - 500 g/L formulations)
MCPA ester (0.45 L/acre - 500 g/L formulations)
Pardner (0.40 L/acre)*
Prestige (20 acres per case)
Thumper (0.40 L/acre)*

* Tank mixes with Buctril M, Thumper, or Pardner may result in some temporary initial injury in the form of leaf tip burn.

** Temporary crop injury and a reduction in wild oat control may occur with the Attain tank mix.

When applying broadleaf herbicides not listed above, in the same field, always apply Achieve first. Apply the broadleaf product no sooner than seven days after application of Achieve.

Fertilizers: None registered.

Insecticides: Achieve 80 DG and Achieve Liquid, plus Buctril M and Pardner tank mixes, may be mixed with Decis Flowable at 0.049 L (49 mL)/acre.

Fungicides: None registered.

Note: The above mixes are those listed on the Achieve labels only. For additional mixes see the blue chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Timothy and treated cereal crops must not be grazed or cut for feed within 16 days of treatment. Straw from treated crops may be fed to livestock.

Treated forage grasses grown for seed production must not be grazed or cut for feed.

Do not graze treated forage crops in the year of treatment (except timothy).

Preharvest: Do not apply within 60 days of harvest.

Recropping: Do NOT replant treated areas to tame oats or corn for at least 4 weeks after application.

Aerial Application: Achieve may be applied by air in 2.5 to 4 gallons/acre (11 to 18 L/acre). Do not apply within 50 m of fish bearing waters and wildlife habitat.

Storage: Store in a dry place. May be frozen.

Environment: Do not apply within 15 m by ground (50 m by air) of fish bearing waters, wetlands and wildlife habitat.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Caution Eye Irritant

Achieve Extra Gold

Herbicide Group – 1,4,6
(Refer to page 27)

Company:

Syngenta

Formulation:

Achieve Extra Gold contains 3 components.

Achieve 40 DG - 40 percent tralkoxydim formulated as a dispersible granule. Container size - 4 kg.

Buctril M - 280 g/L bromoxynil and 280 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 8 L.

Turbocharge adjuvant. Container size - 4 L.

Crops and Staging:

Spring wheat (including durum), barley - 2 leaf to early flag leaf stage.

Winter wheat, rye (spring and fall) - from the time growth commences in the spring to the early flag leaf stage.

Weeds and Staging:

Grassy weeds controlled include:

Wild oats - 1 to 6 leaf stage (total leaves including tillers with a maximum of 2 tillers)

Barnyard grass, Persian darnel - 1 to 4 leaf stage (total leaves including tillers)

Green and yellow foxtail - 1 to 5 leaf stage (total leaves including tillers with a maximum of 1 tiller)

Volunteer tame oats - 1 to 6 leaf stage.

Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are controlled before tillering.

Broadleaf weeds controlled include:

Up to the 4 leaf stage:

American nightshade
Ball mustard
Bluebur
Cocklebur
Cow cockle
Flixweed
Green smartweed
Kochia*
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed
Russian thistle*
Scentless chamomile
  (spring annuals only)
Shepherd's-purse
Velvetleaf**
Volunteer canola
Volunteer sunflower

Up to the 6 leaf stage:

Wild tomato

Up to the 8 leaf stage:

Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tartary buckwheat
Volunteer tame buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

Perennials (top growth control):

Canada thistle
Perennial sow-thistle

* Spray before plants are 2 inches (5 cm) in height.

** Spray before plants are 3 inches (8 cm) in height.

Cost (2002 suggested retail price):

$22.15/acre.

Rates:

One case treats 20 acres. Add Turbocharge at a rate of 0.5 L per 100 L spray solution.

Add ammonium sulfate at 7.5 to 15 lb/100 gallons water (0.75 to 1.5 kg/100 L water) when water analysis shows bicarbonate levels are 400 ppm or greater.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 5 to 10 gallons/acre (23 to 45 L/acre). Do not apply with air assist sprayers set to apply less than 5 gallons/acre (23 L/acre) water volume as mixing problems or unacceptable crop injury could occur.

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° degree flat fan nozzles. All strainer and nozzles screens must be 50 mesh or coarser.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Cereal crops that have set tillers may incur injury (yellowing and/or stunting) if applications are made within 48 hours of freezing temperatures. Cereal crops that have not set tillers may be injured if exposed to temperatures of 4°C or less up to 48 hours before or after application. Tank mixing with a broadleaf weed herbicide under adverse conditions may increase severity of crop injury. Crops under stress from foliar diseases or low fertility are more susceptible to injury from application. Temporary crop injury may occur when Achieve Extra Gold is applied under extreme environmental conditions (dry or wet, cool or hot weather) resulting in crop stress. Control of grasses could be reduced when they are stressed due to drought, heat, lack of fertility, flooding or prolonged cool temperatures.

Tank Mixes:

Herbicides: May be tank mixed with 0.22 L/acre MCPA ester (500 g/L formulations). A reduction in green foxtail control may occur with this tank mix.

Fertilizers: None registered.

Insecticides: May be tank mixed with 0.049 L/acre Decis Flowable.

Fungicides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Do not graze treated crops or cut for feed within 30 days of application.

Preharvest: Do not apply within 60 days of harvest.

Recropping: Do NOT replant treated areas to tame oats or corn for at least 4 weeks after application.

Aerial application: Achieve Extra Gold may be applied by air in 2.5 to 4 gallons/acre (11 to 18 L/acre) water.

Storage: May be frozen.

Environment: Do not apply within 15 m of fish bearing waters and wildlife habitat.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

▽ Caution Poison, Caution Eye Irritant (Achieve 40 DG)

◇ Warning Poison (Buctril M)

Ally Toss-N-Go

Herbicide Group – 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

60 percent metsulfuron methyl formulated as a dry flowable.

Container size - 122 g package (4 x 30.5 g water soluble bags).

Crops and Staging:

Cereals: Wheat (spring and durum), barley - 2 leaf to flag leaf stage

Forage Grasses (seedling or established)*: Apply from the 2 leaf to flag leaf stage and before canopy is dense enough to prevent thorough leaf coverage.

For forage or seed production*:

crested wheatgrass

intermediate wheatgrass

orchard grass

For seed production only:

creeping red fescue*

Pasture and Rangeland

* NOTE - Since applications to forage grasses have been registered under the User Requested Minor Use, the manufacturer assumes no responsibility for herbicide performance. Application to forage grasses is at the risk of the user.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Cereals and forage grasses:

Unless otherwise indicated, apply to weeds at the 2 to 4 leaf stage.

Weeds Controlled:

Ball Mustard
Bluebur
Chickweed
Common groundsel
Corn spurry
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Prostrate pigweed
Redroot pigweed
Scentless chamomile
Shepherd's-purse
Stinkweed
Stork's-bill
Tartary buckwheat
Volunteer canola*
Wild mustard

* CLEARFIELD varieties will be controlled only with the addition of 2,4-D or MCPA.

Weeds Suppressed:

Canada thistle**
Lamb's-quarters
Russian thistle
Sow-thistle (annual and perennial)
Toadflax
Wild buckwheat***

** Apply when thistles are less than 6 inches (15 cm) tall.

*** Apply to wild buckwheat up to the 3 leaf stage.

Pastures and Rangelands:

Western snowberry
Wild rose

Cost (2002 suggested retail price):

$3.76 to $5.65/acre.

Rates:

Cereals and forage grasses:

When applied alone or in tank mix with a grass control herbicide use Ally at 3 g/acre (One 122 g package of Ally treats 40 acres). Use 2-3 g/acre Ally when tank mixing with 2,4-D or MCPA. Add non-ionic surfactant such as Agral 90, Agsurf, Companion, Super Spreader or Citowett Plus at 0.2 L per 100 L spray volume.

Pastures and Rangelands:

Apply Ally at 10 g/acre for western Snowberry control.
Apply Ally at 12 g/acre for wild rose control

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:

Cereals and forage grasses: 10 gal/acre (45 L/acre).
Pastures and Rangelands: 10 to 20 gal/acre (45 to 90 L/acre).

Pressure: No application pressures are recommended by the manufacturer. Typical application pressures for standard flat fan nozzles are from 35 to 40 psi (240 to 275 kPa).

Nozzles: Flat fan nozzles. Use 50-mesh screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Ally may injure crops stressed by heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures, drought, or water-saturated soils, either before or after application. Weed control will be reduced under dry, cold conditions.

Tank Mixes:

Do not mix the soluble bags with any substance containing boron or which releases chlorine.

Herbicides:

In wheat and barley:
2,4-D Amine or Ester (0.34 to 0.45 L/acre of 500 g/L formulation), plus surfactant.
Avenge (1.72 L/acre), no surfactant required.
Avenge + MCPA Ester, no surfactant required.
MCPA Amine or Ester (0.28 to 0.45 L/acre of 500 g/L formulation), plus surfactant.

In spring wheat (including durum):
Horizon (0.095 or 0.115 L/acre) plus Score adjuvant
Puma 120 Super (0.154 to 0.308 L/acre)

In Creeping Red Fescue:
Assure II (0.2 to 0.3 L/acre) plus Sure-Mix at 0.5% of spray volume

Consult tank mix partner labels for additional crop staging and variety restrictions.

Fertilizer: None registered. Do not mix the soluble bags with fertilizers.

Insecticides: None registered.

Note: The above mixes are those listed on the Ally label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 hours of application of tank mixes with 2,4-D amine, 2 hours of application of tank mixes with 2,4-D ester, will reduce weed control.

Grazing: No restrictions.

Recropping: Refer to table below. The following recropping intervals, based on soil pH, should be considered as guidelines only. Ally residues may affect crops for a longer period of time than outlined in the following table. Add 12 months to recommendations if less than 5 inches (130 mm) of rainfall in brown and dark soils or less than 10 inches (250 mm) rainfall in black or grey wooded soils in any year following application.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

Ally can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Ally should be flushed out immediately after Ally is used. The manufacturer recommends that sprayers used to apply this product be flushed 2 times with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

For additional information refer to page 14.

Hazard Rating:

Caution Poison

Caution Eye Irritant

Caution:

Ally residues can persist for long periods, potentially limiting recropping options. Degradation of Ally is dependent on the pH, moisture, and temperature of the soil. Refer to the label for details on rotation and minimum recropping intervals.

MINIMUM RECROPPING INTERVAL (MONTHS)

SOIL PH	BARLEY, WHEAT	OAT*	CANOLA*	FLAX*	LENTILS	CANARY-SEED	YELLOW MUSTARD
less than 7.0	10	10	10 (22)	10 (22)	34	48	48
7.0 - 7.9	10	10 (22)	22 (34)	34	48	48	48

* Figures in brackets refer to recropping intervals in brown and dark brown soil zones. ALL OTHER DATA refer to recropping intervals in all soil zones.

On black and grey wooded soils with pH of 7.5 or less, fescue may be planted 10 months after application and alfalfa, red clover, peas and flax may be planted 22 months after application. Do not use on soils with pH greater than 7.9.

Amitrol 240

Herbicide Group – 11
(Refer to page 27)

Company:

Nufarm

Formulation:

231 g/L amitrole formulated as a liquid.
Container size - 10 L.

Crops, Rates and Staging:

Fall Stubble: Perennial weed control prior to spring seeding. No planting restrictions for barley, canola, field corn, field pea, soybean, wheat, or white bean, but leave 8 months between application and the seeding of any other crops.

Alfalfa stand renovation/removal: 4 to 6 inches (10 to 15 cm) high.

Pastures: For non-selective patch treatment of dandelion, Canada thistle, perennial sow-thistle, hoary cress, milkweed, poison ivy and toadflax apply 0.165 L in 25 L of water to treat a 10 m x 10 m area. For treatment of leafy spurge and horsetail, apply 0.46 L in 25 L of water to treat a 10 m x 10 m area. Do not mow treated plants for 3 weeks after application.

Established shelterbelts: up to 11.3 L/acre - Keep spray away from tree foliage or trunks.

Pre-seeding:

CROP	RATE (L/ACRE)	Delay seeding after application
Barley, wheat, canola	1.7	0 to 1 days
Field Pea	1.7	10 to 14 days
Soybean (low rate)	1.7	6 days
Field corn, white bean, soybean (high rate)	3.3 to 6.7	10 to 14 days

Avoid using rates higher than 6.7 L/acre for preplant applications on very light textured soils with low organic matter, as crop damage can occur.

Fallow areas – apply according to weed stage and rates below.

Weeds, Rates and Staging:

Fall stubble: Canada thistle, perennial sow-thistle - Spray when thistle has 4 to 6 inches (10 to 15 cm) of new growth. Do not cultivate for 2 weeks after application. Do not apply after October 1. Do not replant crops in treated areas within 8 months of application except those registered for pre-seeding uses.

Pre-seeding: Dandelion and annual weeds Apply 1.7 L/acre to actively growing weeds less than 10 cm tall or across. Do not cultivate for 10 to 14 days after treatment.

Fallow, Pastures and Shelterbelts:

WEED	RATE (L/ACRE)	WEED STAGE
Canada thistle	5.0 to 6.7	Early bud to bloom stage.
Cattails	15.2 to 18.5	After seed heads have formed.
Dandelion	1.7 to 5.0	Young and actively growing plants.
Hoary Cress	7.6 to 11.3	Advanced rosette and bud stage.
Horsetail		5.0 to 6.7 Actively growing plants.
Leafy Spurge	15.2 to 18.5	Advanced flowering to early seed set
Milkweed	7.6 to 11.3	Early summer after majority of shoot emergence.
Perennial sow-thistle	5.0 to 6.7	Early bud to bloom stage.
Poison Ivy	3.7	Fully developed green foliage.
Toadflax	7.6 to 11.3	Advanced rosette to prebud.

Cost (2002 suggested retail price):

$6.40/L.

Application Information:

Water Volume:

Fall stubble: 5 to 20 gal/acre (20 to 90 L/acre).

Pastures, shelterbelts: 10 to 30 gal/acre (45 to 135 L/acre). For poison ivy, apply 50 to 100 gal/acre (225 to 450 L/acre).

Pre-seeding: 5 to 20 gal/acre (20 to 90 L/acre).

Pressure: 45 psi (Less than 300 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Less than acceptable results may occur in dry weather.

Tank Mixes:

Herbicides: Mix 1.68 L/acre Amitrol 240 with 0.5 L/acre Roundup for improved control of certain weeds, including dandelion. Follow directions on the Amitrol 240 and Roundup labels for timing and use precautions.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crops or weeds or use for hay or feed.

Recropping: Do not plant any crop for 8 months following application except those registered for pre-seeding uses.

Aerial Application: Do not apply by air.

Storage: Do not store where temperatures may exceed 50°C or near open flames. Do not store below 4°C.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

☠ Caution Poison

Caution eye irritant

Avoid breathing spray mist or vapours.

Do not re-enter treated areas within 12 hours.

Assert 300 SC

Herbicide Group – 2
(Refer to page 27)

Company:

BASF Canada

Formulation:

Assert: 300 g/L imazamethabenz formulated as a suspension concentrate. Container size - 2 x 10.8 L jugs per case.

pH adjuster: 94.5% sodium bisulfate formulated as a soluble granule. Container size - 2 x 0.5 kg bags (1 bag per 10.8 L jug of Assert).

Crops and Staging:

Barley and Spring wheat (including durum) at the 1 to 6 leaf stage.

Sunflower at the 2 to 8 leaf stage. Crop must be less than 15 inches (38 cm) tall except for semi-dwarf varieties, which must be less than 12 inches (30 cm), and dwarf varieties which must be less than 4 inches (10 cm). Stunting and head deformation can occur from applications made beyond recommended stages.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled in cereals:

Wild oats - 1 to 6 leaf stage (all leaves, including tillers) up to 2 tillers.
Wild mustard and stinkweed - cotyledon to 6 leaf stage.
Wild buckwheat and tartary buckwheat (suppression only) - cotyledon to 4 leaf stage.

Weeds controlled in sunflowers:

Stinkweed and Wild mustard at the cotyledon to 6 leaf stage.

Cost (2002 suggested retail price):

Cereals - $13.32 to $16.58/acre
Sunflower - $8.32/acre (wild mustard only).

Rates:

pH adjuster - 1 packet per jug of Assert to be used.

Sunflowers - Apply 0.34 L/acre. One 10.8 L container treats 32 acres.

Cereals - Apply 0.54 L/acre if majority of wild oats are in the 1 to 3 leaf stage. One container treats 20.3 acres.

Apply 0.67 L/acre if majority of wild oats are in the 4 to 6 leaf stage (all leaves, including tillers) up to 2 tillers or when tank mixing with a broadleaf herbicide. One 10.8 L container of Assert treats 16.1 acres.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Apply in 5 to 10 gallons/acre (23 to 45 L/acre) water when tank mixing Assert with Estaprop, 2,4-D ester, or MCPA ester. For all other applications, apply in 10 gallons/acre (45 L/acre) water.

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply Assert 24 hours before or after a frost. It works best at warm temperatures. Performs relatively consistently under dry conditions. If cold, wet soil conditions persist in the days after application, retillering of wild oats may occur. Do not apply to drought stressed sunflowers.

Tank Mixes:

Herbicides:

Assert must be applied at 0.53 to 0.67 L/acre when tank mixed with other herbicides for additional broadleaf weed control, depending on soil zone.

In Spring Wheat (including durum) and Barley:

2,4-D Ester* - up to 0.32 L/acre (700 g/L formulations)
Curtail M - 0.80 L/acre
Dichlorprop + 2,4-D (Estaprop only)* - 0.70 L/acre
Express Pack*** - 40 acres per case.
MCPA Ester* - up to 0.45 L/acre (500 g/L formulations)
Puma120 Super** - 0.15 L/acre
Puma120 Super + MCPA Ester, or Refine Extra (at rates listed)
Refine Extra*** - 8 g/acre
Refine Extra*** (8 g/acre) + MCPA Ester 0.28 to 0.45 L/acre (500 g/L formulations)
Unity*** - 40 acres per case

In Spring Wheat (NOT including durum) and Barley:

Attain - 40 acres per case.
Prestige - 20 acres per case

In Spring wheat and durum wheat only:
Dichlorprop + 2,4-D (Turboprop 600 only) - 0.70 L/acre

* apply in 5-10 gal/acre (23-45 L/acre). For all other tank mixes use 10 gal/acre (45 L/acre)

** use the 0.54 L/acre rate of Assert when tank mixing with Puma120 Super

*** When tank mixing dry broadleaf products, add products to the tank in the following order: dry broadleaf products, acidifier, Assert, and other liquid herbicides if required. For repeat tanks, dry broadleaf products need to be mixed with water to form a slurry prior to adding to the remaining spray solution in the tank.

Refer to tank mix partner for additional crop staging restrictions.

Tank mixes containing Refine Extra must be used within 12 hours or product degradation may occur. Refer to the product label for application details.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Assert label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Grazing: Do not graze treated fields or cut treated forage for silage or hay. Matured barley and wheat grain or straw from fields treated with Assert can be fed to livestock. Do not feed or graze treated annual ryegrass.

Preharvest Interval: Do not apply beyond the recommended crop stage.

Recropping:

Year After Application	Black and Grey Wooded Soils	Brown and Dark Brown Soils
Year 1	Spring wheat (including durum), barley, canola, field peas, flax, sunflowers	Spring wheat (including durum), CLEARFIELD canola, barley, sunflowers
Year 2	Spring wheat (including durum), barley, canaryseed, canola, field peas, flax, oats, sunflowers	

Recropping Cont'd:

Conduct a field bioassay (a test strip grown to maturity) the year before growing any crop not listed in the table. Lentils are known to be particularly sensitive to Assert residues in the soil. The additive effect of soil residues from the use of Assert and sequential applications of Ally or Unity (not for use in Manitoba) herbicides on the same land area has not been determined. Crop rotation guidelines are not known and injury to rotational crops other than wheat (excluding durum) may occur. Plant only wheat (excluding durum) on fields where these herbicides have been used until a field bioassay demonstrates other crops can be grown successfully.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: Leave a distance of 15 m between the outside boundary of the sprayed area and bodies of water (lakes, ponds, sloughs, streams, rivers, etc.).

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Assure II

Herbicide Group – 1
(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

Assure II - 96 g/L quizalofop-p-ethyl formulated as an emulsifiable concentrate. Container size - 8 L.

Sure-mix adjuvant. Container size - 8 L.

Crops and Staging:

No leaf stage restrictions, but do not apply beyond preharvest intervals listed in the table:

CROP	PREHARVEST INTERVAL (DAYS)
Canola	64
Dry Beans (navy and pinto)	65
Flax (including Solin)	82
Lentils	65
Peas (field and processing)	65
Soybeans	80

Forage Crops (no preharvest interval restrictions):

alfalfa
clovers (white, red, alsike and sweet)*
creeping red fescue*
seedling bird's-foot trefoil*
seedling sainfoin*

* Seed production only. Since these crops have been registered under minor use application, the manufacturer assumes no responsibility for herbicide performance. Application to these crops is entirely at the risk of the user.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Costs (2002 suggested retail price):

$12.38 to $24.75/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (210 to 275 kPa).

Nozzles: Flat fan with 50 mesh or coarser nozzle screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop injury may occur if crops are stressed because of drought or flooding. Less than acceptable weed control may be expected if weeds are under stress because of drought, flooding or cool weather.

Weeds, Rates and Staging:

Add Hi-Mix at a rate of 0.5 to 1.0 L per 100 L spray solution or Sure-Mix at a rate of 0.5 L per 100 L spray solution. Use 1.0 L per 100 L when wild oats or quackgrass are present in the field or when growing conditions are poor.

WEED	STAGE	RATE	
		L/ACRE	ACRES PER CASE
Wild oat*	1 to 5 leaf prior to tillering	0.15	54
	up to 2 tillers	0.20	40
Green foxtail	2 leaf to early tillering	0.15	54
Volunteer wheat, barley & oat	2 leaf to early tillering	0.15	54
Volunteer corn	2 to 6 leaf stage	0.15	54
Barnyard grass, Yellow foxtail, Proso millet, Fall pannicum, Old witchgrass	2 leaf to early tillering	0.20	40
Quack grass suppression	2 to 6 leaf stage	0.20	40
Quack grass - season long control	2 to 6 leaf stage	0.30	26

* Best results are likely to occur if applications are made before tillering begins. Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

Tank Mixes:

Herbicides:

In Canola: Muster (8 to 12 g/acre)

In Soybeans: Pinnacle (2.2 to 3.3 g/acre).

In Established creeping red fescue for seed: Assure II at 0.2 to 0.3 L/acre may be tank mixed with Ally (3 g/acre). Allow 24 hours after application before applying a broadleaf herbicide. If the broadleaf herbicide is applied first, wait 7 days before application of Assure II.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Assure II label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Grazing: Do not graze treated crops or cut for feed prior to crop maturity.

Preharvest Interval: See Crop chart above.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: Do not apply within 15 m of sensitive habitats such as shelterbelts, wetlands, sloughs, or woodlots.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Danger – Corrosive to eyes

Warning eye and skin irritant

Atrazine

Herbicide Group – 5

(Refer to page 27)

Company:

Syngenta (Aatrex Liquid, Aatrex Nine-0).
United Agri Products (Atrazine 480, Atrazine 90 WG).
Van Waters and Rogers Ltd. (Drexel Atrazine 500).

Formulations:

Aatrex Liquid/Atrazine 480 - 480 g/L atrazine formulated as a liquid.

Drexel Atrazine 500 - 500 g/L formulated as a liquid. Aatrex Nine-0/Atrazine 90 WG-90 percent atrazine formulated as a dispersible granule.

Container sizes - various.

Crops and Staging:

May be applied to corn (silage, field, sweet) using the following applications:

Pre-plant incorporated (PPI).

Pre-emergent surface (after planting but before emergence of weeds and crop) - are recommended only on irrigated fields. Inconsistent weed control will occur if 0.5 inches (1.25 cm) of water/precipitation does not occur within 7 days of application.

Post-emergence - 1 to 6 leaf stage and when corn is less than 12 inches (30 cm) tall.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

For pre-emergent and post-emergent control (when weeds are less than 4 inches or 10 cm tall) of the following weeds:

Common purslane
Lady's-thumb
Lamb's-quarters
Ragweed
Redroot pigweed
Smartweed
Volunteer clover
Wild buckwheat
Wild mustard
Wild oats
Wormseed mustard

Rates:

	ATRAZINE 90 WG, AATREX NINE-O	ATRAZINE 480, AATREX LIQUID	DREXEL - ATRAZINE 500
Preplant incorporated; Pre-emergence (irrigated corn only)	0.45 to 0.69 kg/acre	0.85 to 1.25 L/acre	0.81 to 1.21 L/acre
Postemergence	0.45 to 0.69* kg/acre	0.85 to 1.25* L/acre	0.81 to 1.21 L/acre

* Add 1.11 to 2.23 L/acre of oil concentrate or 6.88 L/acre crop oil with post-emergence applications of these products. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Crop injury may occur when Atrazine and oil is applied post-emergence during cold weather.

Use the low rate on crops grown on sandy soils, and where weed infestations are light.

Cost (2002 suggested retail price):

Atrazine Liquid formulations - $6.16 to $6.85/L; Granular formulation - $11.04/kg.

Application Information:

Water Volume: 15 to 30 gallons/acre (70 to 135 L/acre).

Pressure: 30 to 45 psi (200 to 300 kPa).

Nozzles: Flat fan with 50-mesh or coarser screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Post-emergent applications made during periods of cold weather may cause crop lightening. Hot, dry weather preceding post-emergent applications may result in reduced weed control. Atrazine will move with soil if eroded.

Tank Mixes:

Herbicides:

Pre Plant Incorporated - Eradicane (not sweet corn)
Pre-emergent Surface Applied- Banvel II**.
Post-Emergent* - Banvel II (not sweet corn), Pardner.

* Do not use oils or adjuvants with post-emergent tank mixes.

** Drexel Atrazine 500 only.

Fertilizers: For pre-emergence applications, nitrogen solutions or complete liquid fertilizers may replace all or part of the water as a carrier for some formulations of atrazine. Aatrex Nine-O and Aatrex Liquid may be impregnated onto dry granular fertilizers. Do not impregnate onto nitrate or super-phosphate.

Do not apply atrazine with nitrogen fertilizer after corn has emerged, as crop injury will occur.

Insecticides: None registered.

Note: **The above mixes are those listed on atrazine labels only. For additional mixes see the blue fold out chart inside the back cover.** Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours of postemergence applications may result in reduced weed control.

Grazing: Do not graze or cut for feed before ear emergence.

Recropping: All crops, except corn and triazine-tolerant canola, may be affected the year following the use of atrazine. Flax, peas and fababeans have some tolerance to atrazine residues and are usually not affected by rates of up to 0.9 L/acre (500 g/L formulations) or 0.5 kg/acre (90 percent atrazine formulations) applied the previous year. Other more sensitive crops may be affected 2 or more growing seasons after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze Aatrex Liquid or Atrazine 480.

Environment: Do not mix or load within 30 m, or apply within 10 m, of any wells, lakes, streams, ponds, dugouts or sinkholes.

Tank Cleaning:

When finished spraying atrazine, run clean water through the tank, pump and lines. Drain and refill with 1 L of household ammonia per 100 L water. Circulate the solution through lines and nozzles. Let solution stand for several hours. Scrub inside surfaces but do not enter tank. Flush sprayer system with water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Attain

Herbicide Group – 4

(Refer to page 27)

Company:

Dow AgroSciences.

Formulation:

The Attain package has 2 components:
Attain A: 180 g/L fluroxypyr
Attain B: 564 g/L 2,4-D LV ester.
Both formulated as emulsifiable concentrates.

Container sizes - Attain A - 9.6 L, Attain B - 2 x 8 L.

Crops and Staging:

Spring wheat (not durum) barley and Tall Fescue (seedling and established for seed production only)* at the 4 leaf to flag leaf stage.

* Since this product is registered under minor use application, the manufacturer assumes no responsibility for herbicide performance. Users of this product do so at their own risk

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled at the 2 to 4 leaf stage, unless specified include:

Bluebur
Burdock
Cleavers (1 - 4 whorls)
Clover (sweet)
Cocklebur
Field horsetail*
Flixweed
Goat's beard
Hoary cress*
Kochia
Lamb's-quarters
Mustards
 (except dog and tansy)
Plantain
Prickly lettuce
Ragweed
Round leaved mallow
 (1 - 6 leaf)
Shepherd's-purse
Stinkweed
Stork's-bill
 (1 - 8 leaf)
Sunflower (annual)
Vetch
Volunteer canola
Volunteer flax
Wild radish
Wild buckwheat (1 - 4 leaf)
Wild mustard

The following weeds will be controlled only when growing rapidly (control may be reduced when weed infestations are heavy).

Blue lettuce*
Dandelion**
Leafy spurge*
Oak-leaved goosefoot
Docks
Dog mustard
Field bindweed*
Field peppergrass
Lady's-thumb
Redroot pigweed
Russian thistle
Smartweed
Tansy
Tartary buckwheat

Weeds suppressed include:
Annual sow-thistle
Canada thistle*
Common chickweed(up to 3 inches (8 cm) in height
Hemp-nettle (2 - 6 leaf stage)
Perennial sow thistle*

* Top growth only
** Spring rosettes only.

Cost (2002 suggested retail price):

$8.76/acre.

Rate:

Apply Attain A at 0.24 L/acre and Attain B at 0.40 L/acre. One case of Attain treats 40 acres. Make only one application per year.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa)

Nozzles: Use nozzles that deliver a uniform coverage while minimizing fine droplets prone to drift.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Attain activity is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

Tank Mixes:

Herbicides:

In spring wheat (not including durum) and barley:
Achieve 80DG (0.1 kg/acre) plus Turbocharge adjuvant.*
Assert (0.53 to 0.65 L/acre)

In spring wheat (not including durum) only:
Horizon (95 mL/acre) plus Score adjuvant.*
Puma120 Super (0.16 to 0.31 L/acre)

Insecticides: None registered.

Fungicides: None registered.

*Temporary crop injury (Achieve only) or reduced wild oat control may occur with these tank mixes.

Note: The above mixes are those listed on the Attain label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not permit lactating dairy animals to graze fields within 7 days of application. Do not harvest forage or cut hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Preharvest Interval: Do not apply within 60 days of harvest.

Recropping: Wheat, barley, oats, rye, forage grasses, flax, canola, mustard, lentils and peas may be grown the year after an Attain application. There are no recropping restrictions the second year after application.

Aerial Application: Do not apply by air.

Storage: May be frozen. If frozen, bring to room temperature and agitate before use.

Environment: Avoid drift onto non-target areas. Leave a buffer of 15 meters from water bodies, wetland areas and plants that may be injured by Attain

Tank Cleaning:

Refer to page 14.

Hazard Rating:

☠ Danger Poison.

Warning Eye Irritant.

Caution Skin Irritant.

Avadex BW*/ Avadex MicroActiv

Herbicide Group – 8

(Refer to page 27)

Company:

Monsanto Canada Inc.

***Note: Avadex products are no longer being manufactured and this page may be removed from the 2004 Guide to Crop Protection.**

Formulation:

400 g/L triallate formulated as an emulsifiable concentrate.
Container sizes - 22.7 L, 115 L.

10 percent triallate formulated as a granular.
Container size - 22.7 kg, 454 kg.

Crops, Rates and Application Timing:

Avadex BW Liquid Rates – Spring Treatment

CROP	APPLICATION TIMING	RATE (L/acre)		ACRES TREATED PER 22.7 L CONTAINER	
		Organic Matter		Organic Matter	
		4% or less	Greater than 4%	4% or less	Greater than 4%
Spring and durum wheat	Before Seeding* After Seeding	1.21 1.42	1.42 1.72	18.8 16.0	16.0 13.2
Barley	Before and After Seeding	1.42	1.72	16.0	13.2
Canola, flax, mustard	Before Seeding	1.72	2.23	13.2	10.2
Peas (dry)	Before Seeding	1.72	1.72	13.2	13.2

* Do not apply this product before seeding wheat in soils with 4 percent or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

Avadex BW Granular Rates – Fall Treatment

CROP	RATE (KG/ACRE)			ACRES TREATED PER 22.7 KG CONTAINER		
	Organic Matter			Organic Matter		
	Less than 2%*	2-4%	Greater than 4%	Less than 2%*	2-4%	Greater than 4%
Spring and durum wheat	4.45	5.67	6.88	5.1	4.0	3.3
Barley, canaryseed	4.45	5.67	6.88	5.1	4.0	3.3
Canola, flax, mustard	5.67	6.88	8.90	4.0	3.3	2.6

* Fall treatments conducted under minimum tillage are not recommended on soils with less than 2 percent organic matter.

Avadex BW Granular Rates – Spring Treatment

CROP	APPLICATION TIMING**	RATE (KG/ACRE)		ACRES TREATED PER 22.7 KG CONTAINER	
		Organic Matter		Organic Matter	
		4% or less[1]	Greater than 4%	4% or less	Greater than 4%
Spring and durum wheat	Before Seeding*** After Seeding	4.45 5.67	5.67 6.88	5.1 4.0	4.0 3.3
Barley, canaryseed	Before and after Seeding (barley only)	5.67	6.88	4.0	3.3
Canola, flax, mustard	Before Seeding	6.88	8.90	3.3	2.6

* Minimum tillage treatments must be applied to fields with at least 2 percent organic matter.

** Minimum tillage treatments must be applied 10 to 14 days before seeding or incorporating. For minimum tillage treatments on spring and durum wheat, apply 5.67 kg/acre on soils with 4 percent organic matter or less and 6.88 kg/acre on soils with greater than 4 percent organic matter.

*** Do not apply this product before seeding wheat in soils with 4% or less organic matter (brown, dark brown or grey wooded soils) where discers are to be used for seeding. If an air seeder is to be used, it must be equipped with a depth control device to ensure accurate seed placement, otherwise crop injury may occur.

Seedling Forage Legumes (under-seeded only):

Apply recommended rates for the companion crop.

Alfalfa

bird's-foot trefoil

Clover (alsike, red, sweet)

Weeds and Staging:

For pre-emergent control of Wild oats.

Cost (2002 suggested retail price):

Liquid: $9.47 to $17.45/acre

Granular: $11.62 to $22.79/acre.

Application Information:

Water Volume (Liquid formulations only): 10 gallons/acre (45 L/acre).

Pressure: 30 psi (200 kPa), liquid formulation only.

Nozzles: Flat fan, liquid formulation only.

General Information: The liquid formulation must be incorporated into soil that is free of lumps or trash. The liquid formulation is recommended for spring use because soils are left in an erosion prone state if the liquid is fall-applied. The granular formulation may be incorporated into trashy soil and is best suited for fall use.

Fall Applications (Conventional Tillage): Apply Avadex BW granules to fields that are in good working condition, without excessive trash. Heavy trash or lumpy, wet fields may require tillage prior to application. Avadex BW must be applied after October 1 but before soil freeze-up. Application before October 1 may result in reduced weed control. Only one incorporation is required in the fall. The second incorporation may be done in the fall (before soil freeze-up) or in the spring.

Fall Application (Minimum Tillage): Applications of Avadex BW granules should be made to standing stubble, chemical fallow, or summerfallow fields that are not prone to erosion. Do not apply to smooth, hard packed soils that may allow granules to drift. If excessive crop residue exists at the time of application, harrowing should be conducted to ensure the granules are in good contact with the soil. Apply when the soil begins to cool (less than 4°C) and within 3 weeks of soil freeze-up. Incorporation can be performed in the spring before seeding or as part of the seeding operation.

Spring Application (Conventional Tillage): Apply Avadex BW (liquid or granules) to fields that are in good working condition, without excessive trash. Heavy trash or lumpy, wet fields may require tillage prior to application. Liquid formulations should be applied to fields with 30 percent or less trash cover. Avadex BW may be applied before or after seeding of wheat, barley, or canaryseed and before seeding of canola, flax, mustard or peas (liquid only). If wheat is being seeded into soils with an organic matter content of less than 4 percent, Avadex BW should be applied after seeding.

Spring Application (Minimum Tillage): Avadex BW granules should be applied in spring and when the soil temperature is 4°C or less. Apply granules 10 to 14 days before incorporation. Do not apply more than 4 weeks before seeding is intended.

Incorporation:

Conventional Tillage: Avadex BW applications require 2 incorporations, with the second incorporation at right angles to the first. Using a seeder that provides soil disturbance equivalent to a cultivator may replace 1 incorporation. The first incorporation of the granular formulation should be completed within 48 hours of application and the second incorporation should be delayed an additional 48 hours or more. The first incorporation of the liquid formulation should be completed as soon as possible after spraying, while the second incorporation may be done any time prior to crop emergence.

Incorporate to a depth of 2 inches (5 cm) by setting disc or cultivator implements to cut 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). Incorporations performed after seeding should be conducted with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective incorporation if compact soil prevents penetration of harrow teeth, if trash accumulates in the harrow sections, or if the harrows bounce.

Minimum Tillage: Incorporation of Avadex BW granules in minimum tillage systems is achieved with one high disturbance incorporation, which can be conducted prior to seeding, or as part of the seeding pass. A high disturbance system is one that disturbs the soil enough so that emerged weeds are controlled by the operation (example - air seeder with cultivator shovels). Harrowing after the incorporation operation is recommended for best results.

For optimum results in minimum tillage systems, incorporate when wild oat growth is noticeable in the field, as this will ensure that the soil is warm enough for activation of Avadex BW.

Under excessively warm or wet conditions between application and crop emergence, control may be reduced. For best results on heavy wild oat infestations, use the conventional tillage guidelines for incorporation.

Summer Fallow: Incorporation can be done by a disc followed by harrowing at right angles, a vibrashank cultivator followed by harrowing at right angles, or double harrowing. The second operation can be delayed until spring. If summerfallow must be ridged to prevent soil erosion the granular formulation should not be used in the fall. Note that fall minimum tillage applied granules do not require incorporation in the fall. If soils must be ridged following application of the liquid formulation, ridging depth should be kept to a minimum as deep ridging may reduce wild oat control and increase crop injury.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Reduced control may result if prolonged cool conditions or dry soil conditions prevail at the time weeds are emerging. If conditions are dry or wild oats germinate from below the treated zone, the weeds may emerge, but will usually be controlled. Thinning of wheat can occur under conditions of heavy rainfall or if cold soil conditions persist as the crop emerges.

Tank Mixes:

Herbicides: Avadex BW liquid may be tank mixed with liquid formulations of trifluralin for control of wild oats, green and yellow foxtail in wheat and barley. Apply after seeding but prior to crop emergence. Consult the recommendations for trifluralin for rates in different soil types.

Fertilizer: Avadex BW liquid alone, or tank mixed with liquid formulations of trifluralin, may be tank mixed with liquid fertilizer. Compatibility of the herbicide and liquid fertilizer should be checked. Follow the instructions on the herbicide label prior to adding the herbicide to the spray tank.

Avadex BW liquid may be sprayed on dry urea fertilizer. A minimum of 150 kg/ha (60 kg/acre) of dry urea fertilizer must be used. Only commercial blending is recommended.

Insecticides: None registered.

Restrictions:

Rainfall: At least 0.5 inches (1.5 cm) within 2 weeks of application is required for activation.

Grazing: Do not graze the treated crop or use as hay or feed prior to crop maturity or in year of treatment.

Recropping: Do not seed tame oats the year after treatment.

Aerial Application: May be applied by air with attachments designed for applying low volumes of granules.

Storage: Do not freeze liquid formulations. Store granular formulations in a cool, dry place.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison (liquid formulation)

Skin and Eye Irritant (granular formulation)

Avenge 200 C

Herbicide Group – 8
(Refer to page 27)

Company:

BASF Canada

Formulation:

200 g/L difenzoquat formulated as a solution.
Container size - 20 L.

Crops and Staging:

Apply up the 6 leaf stage of cereal and grass crops:
Barley
Canaryseed
Fall rye (Cougar, Frontier, Kodiak, Puma, Rymin only)
Triticale (Carman and Welsh)
Wheat (AC Barrie, Biggar, Bluesky, CDC Makwa, CDC Teal, Columbus, Conway, Cutler, Fielder, Genesis, Glenlea, Katepwa, Lancer, Leader, Neepawa, Oslo, Pasqua, Selkirk and Wildcat wheat varieties).
Winter wheat (Norstar only)

Forages (only when underseeded to a cereal listed above):
Alfalfa
Bird's-foot trefoil
Bromegrass
Creeping red fescue
Crested wheatgrass
Kentucky bluegrass
Meadow fescue
Orchardgrass
Red clover
Reed canarygrass
Russian wild ryegrass
Sweet Clover
Timothy

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Wild oats at the 3 to 5 leaf stage.

Cost (2002 suggested retail price):

$17.32 to $20.98/acre.

Rate:

Apply Avenge 200 C at 1.42 to 1.72 L/acre. Use the higher rate if wild oat population exceeds 200 wild oats per square metre.

One 20 L container treats 14.1 to 11.6 acres.

Application Information:

Water Volume:
Ground application: 10 gallons/acre (45 L/acre).
Aerial application: 2 to 5 gallons/ acre (8 to 20 L/acre)

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan directed 45° forward.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop injury is worse on cold or hot, humid days than when temperatures are moderate. Best weed control is attained when temperatures are 20 to 30°C, particularly when these temperatures follow application. Do not spray when crop or weeds are wet with heavy dew or rain. Do not apply when crop is under stress from drought, excessive moisture, or heat.

Tank Mixes:

Herbicides:

In wheat and barley:
2,4-D ester (up to 0.45 L/acre of 500 g/L formulation). Do not use amine formulations.
2,4-DB (see 2,4-DB section for rates). May be used on cereals underseeded to forages.
Ally (2 to 3 g/acre)*
Ally + MCPA ester*
Buctril M (0.4 L/acre)
Curtail M (0.8 L/acre)
Dichlorprop + 2,4-D (0.71 L/acre)
MCPA ester (up to 0.45 L/acre of 500 g/L formulation). Do not use amine formulations.
Pardner (0.405 to 0.485 L/acre)
Pardner + MCPA ester
Thumper (0.4 L/acre)

In wheat only:
Accord (54 to 68 mL/acre)
Accord + **EITHER** Buctril M **OR** 2,4-D ester **OR** MCPA ester, **OR** Refine Extra.

In canaryseed:
MCPA ester (0.38 to 0.45 L/acre of 500 g/L formulation)
Pardner (0.405 L/acre)

*No additional adjuvant required.

Insecticides: None Registered

Fertilizers: None registered.

Allow a 5-day interval between the application of Avenge and other pesticides.

Note: The above mixes are those listed on the Avenge label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours of application will reduce control.

Grazing: Do not graze or feed treated cereal crop for 8 weeks after treatment. Do not graze or feed treated forages in the year of treatment. Straw from treated fields can be fed to livestock 8 weeks after application.

Preharvest Interval: Do not apply beyond the recommended crop stage.

Recropping: No restrictions the year after treatment.

Aerial Application: May be applied by air.

Storage: May be frozen.

Environment: Do not contaminate water bodies (sloughs, dugouts, lakes, streams, ponds, etc.).

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison

Banvel II

Herbicide Group – 4
(Refer to page 27)

Company:

BASF Canada

Formulation:

480 g/L dicamba solution.
Container sizes - 2 x 10 L jugs.

Crops, Rates and Staging:

CROP	STAGE	RATE (L/acre)
Spring wheat*	2 to 5 leaf.	0.093 to 0.117
Barley*	2 to 5 leaf.	0.093
Oats*	2 to 5 leaf.	0.093 to 0.117
Canaryseed*	3 to 5 leaf.	0.117
Winter wheat*	In spring - 6 to 10 inches (15 to 25 cm) - prior to flag leaf.	0.093
Spring rye*	2 to 3 leaf	0.093 to 0.117
Corn, field	Broadcast up to 8 inches (20 cm). When higher, use drop-nozzles. Apply no later than 2 weeks prior to tassle emergence and prior to 20 inches (50 cm).	0.243
Corn, field + 2,4-D	Up to 4 inches (10 cm)	0.117
Red fescue	*Seedling:* 2 inches (5 cm) tall. *Established:* up to the flag leaf stage.	0.243
Pastures	Established and actively growing	0.84 to 1.86
Seedling grasses: Fescue (creeping red, meadow, tall), Meadow foxtail, Orchardgrass, Smooth bromegrass, Timothy, Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall)	2 to 4 leaf	0.093 to 0.117
Fall stubble	Apply according to weed stage.	1.0
Fall stubble + glyphosate	Apply according to weed stage.	0.5
Pre-seeding cereals	Apply according to weed stage.	0.127
Chemfallow + 2,4-D	Apply according to weed stage.	0.093 to 0.117
Chemfallow + glyphosate	Apply according to weed stage.	0.243

* Should be mixed with a tank mix partner for broad spectrum control

Weeds, Rates and Staging:

Apply to annual broadleaf weeds at the 2 to 3 leaf stage and to winter annual rosettes up to 2 in. (5 cm) across.

Banvel II applied alone at 0.092 to 0.116 L/acre to control:

Cleavers (High rate only)
Cow cockle
Corn spurry
Canada thistle*
Lady's thumb
Perennial sow-thistle*
Smartweed (green)
Tartary buckwheat
Wild buckwhea

Banvel II at 0.25 to 0.5 L per acre to control the weeds above plus:

Canada thistle**
Canada Fleabane
Field bindweed**
Indian, tumble, wild, wormseed)
Mustard (hare's-ear,
Perennial sow-thistle**
Pigweed (redroot, Russian)
Ragweed (Common, False, Giant)

Banvel II at 0.85 L/acre to control the weeds above plus:

Curled dock*
English daisy
Goldenrod

Banvel II at 1.86 L/acre to control the weeds above plus:

Diffuse knapweed
Goat's-beard
Ground cherry
Pasture sage
Povertyweed
Sheep sorrel
Thyme-leaved spurge

* Top growth only .

**Three consecutive years of treatment are required for complete control.

Canada thistle, Perennial sow-thistle in summerfallow: Apply prior to the bud stage. Must be applied to thistle plants with 6 to 10 inches (15 to 25 cm) of new growth. Brush control in pastures: When brush is actively growing and is 6 feet (2 m) in height or less (in spring or early summer).

Canada thistle control in fall stubble: When thistles exhibit new growth and at least 2 weeks prior to a killing frost.

Refer to label for full lists of weeds controlled by Banvel II plus tank mixes in cereals, pastures, summerfallow and other situations

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost (2002 suggested retail price):

Cost of Banvel II when tank mixed with MCPA/2,4-D in cereals (not including cost of MCPA/2,4-D) - $3.81 to $4.25/acre.

Cost per L - $36.36.

Application Information:

Water Volume:

Preseeding burnoff: 5 to 10 gallons/acre (23 to 45 L/acre)

Annual crops: 10 gallons/acre (45 L/acre)

Pastures, summerfallow and stubble: 10 to 20 gallons/ acre (45 to 90 L/acre)

Corn: 20 to 30 gallons/acre (90 to 135 L/acre)

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop damage (stunting, reduced seed set) can occur if the chemical is applied at any time other than the recommended stage. Do not apply to crop under stress from adverse environmental conditions, such as excess moisture, drought and disease. Apply when air temperature is between 10 and 25°C.

Do not apply:
- when there is a risk of severe temperature fall in the night;
- under high humidity, temperatures above 30°C, or fog conditions, to prevent drift to sensitive crops;
- when wind is blowing toward a nearby sensitive crop;
- when winds are gusty up to 5 mph (8 km/hr).

Tank Mixes:

Herbicides:

	Spring wheat	Winter wheat	Barley	Oats	Seedling Grasses
2,4-D amine (0.34 L/acre)	✓	✓	✓		✓
MCPA Amine (0.34 L/acre)	✓	✓	✓	✓	✓
MCPA K (0.44 L/acre)	✓	✓	✓	✓	✓
Sencor (0.11 to 0.17 L/acre)	✓		✓		
Ally (2 g/acre)	✓		✓		

In Canaryseed: MCPA amine (0.34 L/acre)
In Corn, Spring rye: 2,4-D amine (0.34 L/acre)
In Chemical fallow, stubble: 2,4-D, glyphosate products.
In Red fescue: 2,4-D amine (0.61 L/acre)
In Preseeding burnoff: glyphosate (0.38 L/acre)

Fertilizers: None registered.
Insecticides: None registered.

Note: The above mixes are those listed on the Banvel II label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing and Harvest:

Canaryseed: Use only as birdseed.

Corn: Do not graze cattle or harvest for silage until 7 days after treatment of Banvel II or Banvel II + 2,4-D amine.

Cereals, seedling grasses, pasture: If treated vegetation has been consumed by meat animals within 30 days of Banvel II application, feed the animal with untreated diet for 30 days before slaughter. Meat animals may graze or feed on treated pasture 30 days after Banvel II application without restrictions on slaughter.

Dairy cattle: no restrictions up to 0.50 L/acre.

Use the following guidelines for feeding Banvel II treated forage to dairy animals:

RATE/ACRE	DELAY BETWEEN TREATMENT AND HAYMAKING/ GRAZING (DAYS)
up to 0.5 L	0
0.501 L to 0.93 L	7
0.931 L to 1.86 L	14
1.861 L to 2.87 L	30

Recropping: Grow only cereals, corn, soybeans or white beans the year after treatment with the 1.0 L/acre rate. Grow only cereals, corn, field beans, soybeans or canola the year after applications of 0.5 L/acre. If applications are made after September 1, or if dry weather persists after application, crop injury may occur the following spring.

Aerial Application: May be applied by air on cereals only. Use a minimum of 2 gallons/acre (8 L/acre).

Storage: May be stored at freezing temperatures.

Environment: Do not contaminate domestic or irrigation water. Do not apply around desirable trees or plants or near the root zone of these plants.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Basagran/Basagran Forté

Herbicide Group – 6
(Refer to page 27)

Company:

BASF Canada

Formulation:

480 g/L bentazon formulated as a solution. Basagran Forté has a built-in adjuvant.

Container size - 2 x 9 L jugs.

Crops and Staging:

CROP	STAGE
Soybeans	No restrictions
Dry beans	After the first trifoliate leaf
Corn	No restrictions
Peas*	After 3 pairs of leaves
Fababeans	At least 4 inches (10 cm) tall
Flax (Solin with Basagran only)	After 2 inches (5 cm) in height
Forage grasses for seed production*[a]: bromegrass creeping red fescue crested wheatgrass meadow foxtail orchardgrass timothy.	1 to 7 leaf stage
Forage legumes for seed production*: alfalfa alsike clover red clover sainfoin	After the third trifoliate leaf
Forage millet and Forage sorghum*[a]	3 to 6 leaf prior to canopy closure
Sweet clover and alfalfa for seed production[a]	established
Spring wheat (not durum) applied with 2,4-D[b]	No restrictions (limited to the 4 leaf to flag leaf by 2,4-D staging

[a] Basagran only
[b] Basagran Forté only

*One application per season.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Cost (2002 suggested retail price):

Basagran: $29.43/L not including adjuvant.

Basagran Forté: $ 22.00/L adjuvant included in formulation.

Weeds, Rates and Staging:

Apply the rate listed when weeds in the table are within the recommended height:

ANNUAL WEEDS	0.71 L/acre		0.91 L/acre	
	Inches	Maximum Leaf stage	Inches	Maximum Leaf stage
Buttercup			2-4	6*
Cleavers			1 to 3 whorl stage	
Cocklebur	3-7	6*	7-12	10*
Common chickweed			1 to 3 weeks after emergence	
Common groundsel			2 - 4	
Common ragweed			1-2	6
Corn spurry			1-4	
Giant Ragweed			2-6	4
Hairy galinsoga			2-3	6*
Hairy Nightshade			0.2-0.8	6
Lady's-thumb (smartweed)	1-3	6*	3-8	10
Lamb's-quarters			0.5-1.0	8
Purslane			1-2	6
Redroot pigweed (suppression only)			0.5-1.5	4
Russian thistle (suppression only*)			1-3	4*
Shepherd's-purse	Rosette-4	6*	4 - 10	6
Stinkweed	Rosette-2	6*	2 - 6	6
Stork's-bill			1.5-4	2 to 6 leaf stage
Flower of an Hour	1 - 2	6*	2 - 4	10*
Volunteer canola	0.75-6	8	0.75-6	8
Wild mustard	1 - 5		5 - 10	10
Wild radish			1 - 2	6
PERENNIAL WEEDS	Repeat application 7 to 15 days after first application (if necessary)			
Canada thistle	6 - 8			
Field bindweed	1 - 2.5			
Yellow nutsedge	6 - 8			

*Applies to Basagran Forté only.

Add Assist or XA oil concentrates at 0.41 to 0.810 L/acre to Basagran only. Basagran Forté does not require the addition of Assist or XA oil concentrate. If hot, humid conditions prevail (above 28°C and 80 percent relative humidity), use only the low rate of Assist or XA oil concentrates. Citowett Plus may be used on peas at 0.25 L per 100 L spray mixture.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 to 40 gallons/acre (45 to 180 L/acre). A minimum of 18 gallons/acre (80 L/acre) is recommended for optimum control. *

Pressure: 40 to 60 psi (275 to 425 kPa)*

Nozzles: Flat fan nozzles capable of delivering high water volumes. Direct nozzles 45° forward.

* Higher water volumes and pressures should be used when the weeds are at the upper end of their recommended treatment stage.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Poor results will occur if temperatures are cool. Optimum results are achieved when applied at daytime temperatures between 20 and 28°C. Applications at temperatures greater than 28°C may result in crop injury.

Tank Mixes:

Herbicides:

In soybeans:

Pinnacle at 2.2 to 3.2 g/acre.

In dry beans (in the Red River Valley of Manitoba only):

Basagran only at 0.71 L/acre can be tank mixed with Reflex at 0.23 L/acre plus 0.1% v/v non-ionic surfactant.

In spring wheat (not including durum):

Basagran only at 0.4 L/acre can be tank mixed with 2,4-D amine or ester (500 g/L) at 0.3 - 0.4 L/acre to control Lady's thumb, redroot pigweed and daisy fleabane in addition to those weeds controlled by 2,4-D. This tank mix DOES NOT need any adjuvant.

Fertilizers: Use of fertilizer mixes is not recommended for the western Canadian environment.

Insecticides: None registered.

Allow 4 days between application of Basagran and other herbicides, fertilizers or insecticides.

Note: The above mixes are those listed on the Basagran/Basagran Forté labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6-8 hours will reduce control.

Grazing: Allow 30 days between treatment with Basagran Forté and harvest of forage sorghum and millet for hay. Otherwise do not graze treated crops or cut for feed prior to crop maturity.

Preharvest Interval: 50 days for Basagran + 2,4-D in wheat, 84 days for Basagran + Reflex in Dry beans in Manitoba. Other uses are restricted only by appropriate staging.

Recropping: No restrictions the year after application.

Aerial Application: May be applied by air for weed control in dry beans or soybeans only. Use 5 to 10 gallons/acre (23 to 45 L/acre) water volume. Assist or XA oil concentrate at 0.05 to 0.1 L/acre must be added. Do not use Assist or XA oil concentrate in excess of 0.1 L/acre as substantial crop injury could occur. Do not apply fertilizer mixes in soybean or 2,4-D tank mix in wheat by air.

Crop canopy should not cover the weeds.

Storage: May be frozen.

Environment: Avoid drift onto non-target areas. Do not contaminate domestic, irrigation or natural water sources.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison – Basagran

Warning Poison – Basagran Forté

Buctril M / Mextrol 400 M

Herbicide Groups – 4, 6
(Refer to page 27)

Company:

Bayer CropScience (Buctril M)
Nufarm (Mextrol 400 M)

Formulation:

Buctril M:
280 g/L bromoxynil and 280 g/L of MCPA ester formulated as an emulsifiable concentrate.
Container size - 8 L.

Mextrol 400 M:
200 g/L bromoxynil and 200 g/L of MCPA ester formulated as an emulsifiable concentrate.
Container size – 11.36 L.

Crops and Staging:

Field Crops:

Barley, oats, wheat - 2 leaf to flag leaf stage. Winter wheat - 2 to 4 leaf stage in the fall or after growth resumes in the spring, but prior to flag leaf.

Fall rye - apply from the time growth commences in spring to early flag leaf.

Canaryseed - 3 to 5 leaf stage.

Flax, Solin - 2 to 4 inches (5 to 10 cm) tall.

Corn - 4 to 6 leaf stage.

Seedling forage grasses:

2 to 4 leaf stage.

Bromegrass
Fescue (Creeping red, Meadow)
Orchard grass (Buctril M only)
Reed canarygrass
Russian wild ryegrass
Wheatgrass (crested, intermediate, slender, tall)
Timothy

Established Forage Grasses: Timothy (for seed or hay)- apply prior to the emergence of the flag leaf.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled up to 4 leaf stage:

American nightshade
Bluebur
Ball mustard
Cocklebur
Cow cockle
Flixweed
Green smartweed
Kochia**
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed*
Russian thistle**
Scentless chamomile***
Shepherd's-purse
Volunteer canola
Volunteer sunflower

* May not be controlled in flax.
** Control before plants are 2 inches tall.
*** Spring seedlings only.

Weed controlled up to 6 leaf stage:
Wild tomato (Buctril M only)

Weeds controlled up to 8 leaf stage:

Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tame buckwheat
Tartary buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

Weeds with top growth controlled:

Canada thistle
Perennial sow-thistle

Cost (2002 suggested retail price):

Buctril M – $6.78/acre
Mextrol – $6.36/acre.

Rate:

Buctril M: 0.405 L/acre. One 8 L jug treats 20 acres.

Mextrol 400 M: 0.57 L/acre. One 11.36 L jug treats 20 acres.

Application Information:

Water Volume:
Corn: 20 to 30 gallons/acre (90 to 135 L/acre).
Flax, Solin: 10 gallons/acre (45 L/acre).
Cereals: 5 to 10 gallons/acre (23 to 45 L/acre).
Seedling forage grasses: 15 gallons/acre (70 L/acre).
Established timothy: 15 gallons/acre (70 L/acre).
Aerial: 1.8 to 4 gallons per acre (8 to 18 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan nozzles.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Best weed control when humidity is high at the time of spraying and for the following day or two. Prolonged cool conditions may result in reduced weed control. Spraying during early morning may increase the risk of flax injury.

Avoid spraying in temperatures greater than 25°C. Do not apply to flax, canaryseed or corn if daytime temperatures exceed 27°C within 48 hours before or after application.

Tank Mixes:

Herbicide Tank Mix Table:

Crop	Tank Mix Options
Flax	Fusion, Poast Ultra*, Select
Solin (low linolenic flax varieties)	Select
Spring wheat (including durum)	Accord*, Accord + Avenge**, Achieve, Ally, Avenge, Horizon, MCPA amine, MCPA ester, MCPA K, Puma^{120} Super*, Refine Extra (2.7 g/acre)*
Winter Wheat	Ally, MCPA amine, MCPA ester, MCPA K
Barley	Achieve, Ally, Avenge, MCPA amine, MCPA ester, MCPA K, Refine Extra (2.7 g/acre)*
Oats	MCPA amine, MCPA ester, MCPA K

* Registered for tank mixing with Buctril M only.

** Registered for tank mixing with Buctril M only. Refer to Avenge label for registered varieties.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the Buctril M/Mextrol labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall within 1 hour of application may reduce weed control.

Grazing: Do not graze treated grain or established timothy crops or cut for feed within 30 days of application. Do not graze meadow foxtail in the year of treatment. Do not graze other treated forage grasses within 56 days of treatment.

Preharvest Interval: Flax or Solin: Do not harvest within 60 days of treatment.

Recropping: No recropping restrictions the year after treatment.

Aerial Application: May be applied by air to wheat, barley, and oats only. Must be applied in 1.8 to 4 gallons/acre (8 to 18 L/acre) water volume. Use higher water volume when the majority of weeds are cow cockle, smartweed, hempnettle, pigweed, and Canada thistle.

Storage: Liquid formulation may be frozen.

Environment: Apply when wind is blowing away from sensitive plants and water or wetland areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison

Casoron

Herbicide Group – 1,2
(Refer to page 27)

Company:

Uniroyal Chemical
(distributed by United Agri Products)

Formulation:

4 percent dichlobenil formulated as a granular. Container size - 3 kg, 15 kg.

Crops:

Shelterbelts consisting of the following species:

Ash
Barberry
Birch (cutleaf, weeping)
Boxwood
Caragana
Cedar (White, Eastern Red)
Crabapple
Elm
Forsythia
Juniper
Lilac
Linden
Locust
Maple
Mock orange
Rose
Spirea
Willow

NOTE: Do not apply to shelterbelts with mugo pine, firs, hemlock, spruce or other shallow rooted species or injury may result.

Weeds:

Annual bluegrass
Artemisia (absinthe, wormwood, sage)*
Bindweed*
Canada thistle*
Chickweed
Dandelion*
Foxtail (green and yellow)
Groundsel
Horsetail
Knotweed
Kochia
Lamb's-quarters
Loosestrife
Mustard
Nutsedge*
Pigweed
Plantain
Purslane
Quack grass*
Shepherd's-purse
Smartweed
Sow-thistle
Spurge
Vetch*
Wild buckwheat*

*Controlled with fall applications at the higher rates.

Timing:

In early spring or late fall prior to annual weed emergence, or after cultivation has removed existing weeds.

Weed Stage:

Pre-emergence.

Cost (2002 suggested retail price):

$8.37/kg.

Rates:

45 to 70 kg/acre. At the low rate, a 15 kg bag will treat a 4 yd by 407 yd (4 m by 340 m) strip of shelterbelt. At the high rate, a 15 kg bag will treat a 4 yd by 256 yd (4 m by 214 m) strip of shelterbelt. If application is followed by 0.5 to 1.0 inches (1.3 to 2.5 cm) of irrigation, the lower rates are recommended.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply during periods of high soil temperatures (more than 15°C).

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Storage: Store in a cool, dry place. May be frozen.

Grazing: Do not graze in treated area.

Equipment Cleaning:

Refer to page 14.

Champion^{120} Extra

Herbicide Group – 1, 2
(Refer to page 27)

Company:

DuPont Canada Inc.

Formulations:

Champion^{120}: 120 g/L fenoxaprop-p-ethyl (plus safener) formulated as an emulsifiable concentrate. Container size - 2 x 6.2 L jugs

Extra: 50 percent thifensulfuron methyl, 25% tribenuron methyl; formulated as a water dispersible granule. Container size - 2 x 162 gram containers

Crops and Staging:

Barley at the 2-5 main stem leaf stage with no more than 2 tillers. Treatment at the 3 to 4 leaf stage of the crop will give optimum crop tolerance and weed control.

Do not apply after the 2 tiller stage or crop injury will result. The 2 tiller stage generally occurs around 25 days after seeding.

Weeds and Staging:

Controlled:

Ball Mustard
Barnyard grass**
Chickweed (1-6 leaves)
Common groundsel
Corn spurry
Cow cockle
Green foxtail**
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Narrow-leaf hawk's beard
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola*
Volunteer sunflowers
Wild buckwheat (1-3 leaves)
Wild mustard
Wild oat**

Suppressed:

Canada thistle***
Cleavers (1-3 whorls)
Round-leaved mallow (2-6 leaves)
Scentless chamomile
Sow-thistle***
Stork's-bill
Toadflax (up to 6 inches on 15 cm tall)

* Not including CLEARFIELD canola varieties.

** 1 to 6 main stem leaves prior to emergence of 3rd tiller.

*** up to 6 inches (15 cm), prior to bud stage.

Rate:

CHAMPION^{120} at 0.308 L/acre plus EXTRA: 8 g/acre. One case treats 40 acres (16.2 ha). Add EXTRA to the tank first. Let agitate for a few minutes then add CHAMPION^{120}.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Cost (2002 suggested retail price):

$21.80/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° flat fan nozzles.

How it Works:

Refer to Table 2 on page 29.

Effect of Growing Conditions:

Substantially reduced control and/or crop injury can occur when plants are stressed by very hot combined with very dry conditions and low humidity, severe weather conditions, frost, low fertility, drought, water saturated soil, disease or insect damage.

In particular, Kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

Tank Mixes:

Herbicides: MCPA Ester 500 at 0.34 L/acre

Fertilizer: None registered

Insecticides: None registered

A time interval of 7 days prior to application or 4 days after application of Champion Extra or Champion^{120} Extra tank mix is required before any other pesticide can be applied.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall within 4 hours of application may lessen degree of weed control.

Grazing: Do not graze the treated crops or cut for hay.

Preharvest: 50 days.

Recropping: No restrictions when used as directed.

Aerial application: Do not apply by air

Storage: Store product in closed, original container in a cool, dry, well ventilated room. Do not freeze. If stored for 1 year or longer, shake well before using.

Tank Cleaning:

To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill the tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, and then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water. If the spray equipment is to be used to spray crops other than cereals, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

For additional information, refer to page 14.

Hazard Rating:

Caution Poison

Eye and skin irritants

Champion Plus

Herbicide Group – 1, 2, 4

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

The Champion Plus package contains 4 containers:
2 labelled "Champion FM" and 2 labelled "Plus".

"Champion FM" contains 45 g/L fenoxaprop-p-ethyl, 210 g/L MCPA ester and 70 g/L 2,4-D ester, formulated as an emulsifiable concentrate. Container size - 8.1 L.

"Plus "contains 75 percent thifensulfuron methyl, formulated as a dry flowable. Container size - 81 grams.

NOTE: Champion Plus has been discontinued by the manufacturer and limited supplies remain.

Crops and Staging:

Barley - 2 to 5 main stem leaves with a maximum of 2 tillers. Crop damage will occur if application is made earlier or later than the recommended leaf stages. Do NOT use beyond the 2 tiller stage, usually not more than 25 days after seeding.

Weeds and Staging:

Grass weeds (1 to 5 leaf stage plus 2 tillers)

Wild oats
Green foxtail
Yellow foxtail

Broadleaf weeds with 2 to 4 leaves or less than 4 inches (10 cm) tall, except where indicated:

Annual sunflower
Burdock
Canada thistle***
Chickweed (1-6 leaves)
Cocklebur
Corn spurry
Cow cockle
Field horsetail*
Flixweed**
Green smartweed
Hemp-nettle
Hoary cress*
Kochia
Lady's-thumb
Lamb's-quarters
Mustards (except Dog, tansy)
Plantain*
Prickly lettuce
Ragweeds
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse**
Stinkweed**
Vetch
Volunteer canola
Wild buckwheat (1-3 leaves)
Wild radish

* Top growth control only.
** Spring seedlings only.
*** Suppression only.

Cost (2002 suggested retail price):

$20.50/acre.

Rates:

The Champion Plus box will treat 20 acres. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° stainless steel flat fan tilted forward at a 45° angle. Screens 50 mesh or larger.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply to crop that is stressed by severe weather conditions, frost, low fertility, drought, water-saturated soil, disease or insect damage, as crop injury and poor weed control may result. Very hot temperatures before or after application will stress plants and may result in reduced grass control.

Tank Mixes:

Herbicides: None registered.

Fertilizer: None registered.

Insecticides: None registered.

Do not tank mix with any other chemical additives, pesticides, or fertilizers. Do not use a surfactant with this tank mix. A time interval of 7 days prior to application or 4 days after application of Champion Plus is required before any other pesticide can be applied.

Restrictions:

Rainfall: Within 2 hours may reduce weed control.

Grazing: Do not graze treated crop or cut for feed prior to crop maturity.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze. If stored for 1 year or longer, shake well before using.

Tank Cleaning:

The "Plus" component of Champion Plus can cause severe injury to sensitive crops at very low concentrations. Sprayers used to apply Champion Plus should be flushed out immediately after Champion Plus is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L) prior to using the sprayer on sensitive crops. All nozzles, screens, and filters should be removed and cleaned after applying this product. Refer to label for detailed clean out instructions.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

For additional information, refer to page 14.

Hazard Rating:

Caution Poison

Curtail M

Herbicide Group – 4
(Refer to page 27)

Company:

Dow AgroSciences.

Formulation:

50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.

Container size - 8 L.

Crops and Staging:

Spring wheat (including durum), barley, and oats at the 3 leaf to just before the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions..

Weeds, Rates and Staging:

The following weeds are controlled at the 1 to 4 leaf stage unless specified:

At 0.61 L per acre Curtail M will control light infestations of:

Canada thistle***
Flixweed**
Lamb's-quarters
Shepherd's-purse**
Stinkweed**
Volunteer sunflower
Wild mustard

At 0.8 L per acre Curtail M will control medium to heavy infestations of the above weeds and:

Annual sow-thistle
Common groundsel
Dandelion*
Kochia (suppression only)**
Perennial sow-thistle
 (top growth control only)
Redroot pigweed
Russian pigweed
Scentless chamomile**
Smartweed
Tartary buckwheat
Volunteer canola
Wild buckwheat

* Spring rosettes only

** 2 to 4 leaf stage, (spring seedlings only for winter annuals).

*** Season long control, some regrowth may occur in the fall. Apply from the 4 inch (10 cm) to prebud stage.

Cost (2002 suggested retail price):

$10.85/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan nozzles tilted forward at a 45° angle.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

When weeds are stressed because of drought, flooding, hot or cool (less than 15°C) temperatures, weeds are not actively growing and control may be reduced. Do not apply to weeds stressed longer than 20 days from lack of moisture as poor control can result.

Tank Mixes:

Curtail M at 0.8 L per acre should be used in all tank mixes unless otherwise indicated.

Herbicides:

In spring wheat (including durum) and barley:
Achieve 80 DG at 0.10 kg/acre plus Turbocharge at 0.5 L per 100L spray mixture.

In spring wheat (not including durum) and barley:
Avenge at 1.4 to 1.7 L/acre (no adjuvant required) ◊*
Refine Extra at 8g/acre plus a non-ionic surfactant at 0.2 L per 100 L spray solution with Curtail M at 0.61 L/acre.

In spring wheat (including durum):
Horizon at 92 to 116 mL/acre plus Score at 0.8 L per 100 L spray mixture.

In spring wheat (not including durum):
Assert at 0.52 to 0.64 L/acre plus water pH adjuster at 1 package per jug Assert.

◊ Use the 0.66 to 0.8 L/acre rate of Curtail M only. The 0.66 L/acre rate will control weeds listed for the 0.61 L/acre rate above.

* See Avenge label for varietal restrictions. Allow a minimum of 5 days between the application of Curtail M plus Avenge and the application of any other pesticide, as poor weed control may result.

Check the label for additional crop staging restrictions.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Curtail M label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Grazing: Do not graze treated fields or cut for hay within 7 days of application.

Preharvest Interval: Do not harvest within 60 days of application.

Recropping: Wheat, barley, oats, rye, corn, flax, canola, forage grasses, mustard and field peas may be planted the year after application. Do not sow **any other** crops until the second year after application. Apply manure bedded with straw from treated crops only to the crops listed above.

Aerial Application: Do not apply by air.

Storage: Store in a cool (above 5°C), dry area. If product is frozen, bring to room temperature and agitate before use.

Environment: Avoid drift onto sensitive plants and contamination of water or wetland areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Caution Eye Irritant

Dichlorprop + 2,4-D

Herbicide Group – 4
(Refer to page 27)

Company/Products:

United Agri Products (Turboprop 600)
Nufarm (Estaprop)
IPCO (Dichlorprop-D)

Formulation:

300 g/L of dichlorprop and 282 g/L of 2,4-D ester formulated as an emulsifiable concentrate. Container size - 10 L.

Crops and Staging:

Wheat (spring, durum) and barley - 4 leaf until prior to the emergence of the flag leaf.

Winter wheat - in spring after tillering but prior to the emergence of the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Treat weeds when young and actively growing and before they are shielded by the crop. Additional stage restrictions are indicated.

Annual sow-thistle
Ball mustard
Bluebur
Burdock
Canada thistle*
Cocklebur
Curled dock*
Dog mustard
Flixweed
Hare's ear mustard
Indian mustard
Kochia°°°
Lady's-thumb°°
Lamb's-quarters
Night-flowering catchfly°
Oak-leaved goosefoot
Perennial sow-thistle*
Ragweed
Redroot pigweed
Round-leaved mallow
Russian pigweed
Russian thistle°°°
Shepherd's-purse
Smartweed°°
Stinkweed
Stork's-bill
Tartary buckwheat°°
Tumble mustard
Volunteer canola°°
Volunteer sunflower°°
Wild buckwheat°°
Wild mustard
Wormseed mustard
Toadflax**

* Top growth control only
** Suppression only. Treat before the majority reach 6 inches (15 cm).
° Spring annuals only
°° Treat prior to the 4 leaf stage
°°° Treat up to 2 inches (5 cm)

Cost (2002 suggested retail price):

$5.61 - $6.04/acre.

Rates:

0.71 L/acre (one 10 L container treats 14 acres).

Application Information:

Water Volume: 5 to 20 gallons/acre (25 to 90 L/acre). Use a minimum of 10 gallons/acre of water to reduce the risk of drift.

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Applications made under dry conditions may result in reduced control. Crops under stress from adverse environmental conditions, such as excess moisture, frost or drought, may be injured. Best weed control when adequate soil moisture is present and warm temperatures prevail. Do not apply when daytime temperatures exceed 27°C.

Tank Mixes:

Herbicides:

	Spring Wheat (including durum)	Barley
Estaprop	Achieve 80DG, Avenge	Achieve 80DG, Avenge
Turboprop	Achieve 80DG, Avenge, Assert, Horizon*	Achieve 80DG, Avenge
Dichlorprop-D	Avenge	Avenge

Note: Always refer to the label or the Guide section of the tank mix partner for additional restrictions on staging and varieties.

Fertilizers: None registered.

Insecticides: None registered

Note: The above mixes are those listed on dichlorprop + 2,4-D labels only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Estaprop - Do not graze the treated crop or harvest for hay or feed within 40 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Dichlorprop-D/Turboprop 600 - Do not graze treated crops or cut for feed prior to crop maturity.

Recropping: No restrictions the year after application.

Aerial Application: Certain formulations may be applied by air. Refer to specific product labels for full details for application by air.

Storage: May be frozen.

Tank Cleaning:

Manufacturers of this product warn that even after thorough cleaning, the use of a sprayer that has come in contact with this product may cause damage to susceptible crops. Do not use spray equipment to apply other pesticides to crops sensitive to these products. To clean sprayer, rinse all parts several times with water, then fill sprayer with 1 L of ammonia (3 percent) per 100 L of water and let stand for 24 hours. Rinse several times after with clean water.

Hazard Rating:

◈ Warning Poison

Dual II Magnum

Herbicide Group – 15
(Refer to page 27)

Company:

Syngenta

Formulation:

915 g/L metolachlor formulated as an emulsifiable concentrate. Container size - 12 L.

Crops and Staging:

Preplant incorporated. In areas with good rainfall or under irrigation, may be applied as a pre-emergence surface treatment. When Dual II Magnum is applied to the soil surface, after planting but prior to emergence, at least 0.5 inches of water (1.25 cm) is required within 10 days of application for proper activity.

Corn (field, sweet, silage),
Dry beans
Potatoes
Processing peas
Soybeans
Sweet white lupins

Weeds and Staging:

Apply prior to weed emergence.

American nightshade
Barnyard grass
Eastern black nightshade
Fall panicum
Giant foxtail
Green foxtail
Hairy crabgrass
Old witch grass
Redroot pigweed*
Smooth crabgrass
Yellow foxtail
Yellow nutsedge**

* Suppression only.
** Preplant incorporated treatment only.

Cost (2002 suggested retail price):

$17.88 to $25.02/acre.

Rates:

0.5 to 0.7 L/acre (one 10 L container treats 24 to 17 acres). Use higher rates on heavy textured soils or when high populations of weeds are expected. Make only one application per season.

Application Information:

Water Volume: 15 gallons/acre (70 L/acre).

Pressure: 30 to 45 psi (200 to 300 kPa).

Nozzles: Use flat fan nozzles, 50 mesh screens.

Incorporation:

Apply to a firm seed bed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 6 km/hr (4 mph). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 10 km/hr (6 mph). Incorporation equipment should include rolling or western harrows.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

A moderate rainfall or equivalent irrigation is required within 10 days to activate pre-emergent surface treatments. If rain does not occur, a shallow cultivation or use of a rotary hoe is necessary. Drought conditions that persist after any application may reduce annual grass control. On sandy soils, heavy rainfall following application may cause leaching of Dual II Magnum, resulting in reduced weed control.

Tank Mixes:

Herbicides: In Corn - May be tank mixed with Aatrex in both PPI and pre-emergent applications.

Fertilizers: May be applied with liquid fertilizer. May be impregnated onto dry bulk fertilizers (except nitrate fertilizers, superphosphate fertilizers or limestone).

Insecticides: None registered.

Note: The above mixes are those listed on the Dual II Magnum label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: When PPI, 0.5 inches (1.25 cm) of rain is required after application for proper activity.

Grazing: Do not graze the treated immature crop or cut for hay. In corn, immature means before ear emergence.

Recropping: In the year of treatment, seed only corn, soybeans, white beans, potatoes, snap beans, lima beans, processing peas, sweet white lupins, or (a minimum of 4.5 months after application) winter cereals. If Dual II Magnum has been applied in a tank mix with another product, consult those products' labels for additional recropping restrictions.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Eye Irritant

Potential Skin Sensitizer

DyVel

Herbicide Group – 4

(Refer to page 27)

Company:

BASF Canada

Formulation:

84 g/L of dicamba and 336 g/L of MCPA K+ formulated as a solution.

Container size - 2 x 10 L jugs, 55 L, 110 L.

Crops and Staging:

Spring wheat (including durum), barley or oats - at the 2 to 5 leaf stage.

Winter wheat - apply in spring when crop is 6 to 10 inches (15 to 25 cm) tall but before shot blade stage.

Note: Crop damage can occur if applications are made at other than the recommended crop stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled in the 2 to 4 leaf stage unless otherwise stated:

Ball mustard
Burdock
Cleavers (suppression only)
Cocklebur
Common ragweed
Corn spurry (2 to 3 leaf)
Cow cockle (2 to 3 leaf)
False ragweed
Flixweed
Giant ragweed
Green smartweed
Hare's-ear mustard
Hemp-nettle (2 to 3 leaf)
Indian mustard
Kochia
Lady's-thumb
Lamb's-quarters
Prostrate pigweed
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Tumble mustard
Wild buckwheat
Wild mustard
Wormseed mustard
Wild radish
Volunteer canola (2 to 4 leaf)
Volunteer sunflowers

Top growth control:
Canada thistle
Perennial sow-thistle

Cost (2002 suggested retail price):

$5.43/acre.

Rate:

0.5 L/acre (one 10 L jug treats 20 acres).

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 to 45 psi (275 to 310 kPa). To reduce the risk of drift dam-age to sensitive non-target crops, 20 to 30 psi (150 to 200 kPa) and higher water volumes are recommended.

Nozzles: Flat fan. Select nozzles that produce a low number of fine droplets to reduce the risk of drift.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

For best weed control, apply when temperature is between 10 and 25°C. Do not treat crops under stress from excessive moisture or drought. To avoid crop injury, do not apply when temperature is expected to exceed 30°C, or when there is a risk of a severe drop in overnight temperature.

Tank Mixes:

Herbicides:
In spring wheat:
Horizon - 0.095 L/acre (wild oat control only),
Horizon - 0.115 L/acre (plus green and yellow foxtail).
Everest – 17.4 g/acre plus non-ionic surfactant

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the DyVel label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for hay within 30 days of application.

Preharvest Interval: 60 days.

Recropping: No restrictions the year after treatment.

Aerial Application: May be applied by air. Use a minimum of 2 gallons/acre (8 L/acre) water volume.

Storage: May be frozen.

Environment: Avoid drift onto sensitive plants. Leave a distance of 15 m between the outside edge of the sprayed area and source

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

DyVel DS

Herbicide Group – 4

(Refer to page 27)

Company:

BASF Canada

Formulation:

110 g/L dicamba, 295 g/L 2,4-D amine and 80 g/L mecoprop formulated as a solution.

Container size - 2 x 10 L jugs, 55 L, 110 L.

Crops, Rates and Staging:

CROP	STAGE	RATE	
		(L/ACRE)	ACRES PER 10L JUG
Spring wheat (including durum)	3 to 5 leaf	0.34 to 0.45	29 to 22
Barley	2 to 3 leaf	0.34	29
Winter wheat	before crop is 12 inches (30 cm) tall in spring	0.34 to 0.45	29 to 22
Corn (field and sweet)	before corn reaches 6 inches (15 cm) in height with the top leaf extended	0.34 to 0.45	29 to 22
Native Range and permanent grass pasture	Established	1.3	7.7
Fall Stubble, Summerfallow	Stage according to weed	0.45 to 0.71	22 to 14

Applications outside the recommended stage may result in crop injury.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

The low registered rate for each crop will control the following weeds at the 2 to 3 leaf stage unless otherwise indicated:

Annual smartweed
Annual sow-thistle
Cocklebur
Common ragweed
Corn spurry
Hedge bindweed
Knotweed
Kochia
Lady's-thumb
Lamb's-quarters
Mustards (wild, ball, tall, wormseed, yellow)
Prostrate pigweed
Redroot pigweed
Russian thistle
Sow thistle
Stinkweed*
Volunteer canola (2 to 4 leaf, prior to bolting)
Volunteer tame buckwheat
Wild buckwheat

Use the high registered rate for each crop to control the following weeds:

Canada thistle (top growth only)***
Cleavers (1 to 2 whorls)**
Cow cockle
Field bindweed
Flixweed*
Jerusalem artichoke
Round-leaved mallow**
Shepherd's-purse

* Rosette stage in winter wheat.
** Suppression only.
***Canada thistle should be treated when 6 to 8 inches (15 to 20 cm) of new growth is present in Fall Stubble and in the early bud stage in Summerfallow.

Rates for Native Range and Pasture will control:

Alder
Bull thistle
Chicory
Goat's-beard
Poison ivy
Sheep laurel
White cockle

The high rate for each crop should be used for all weeds under adverse growing conditions, when weeds are at an advanced stage of growth or when weed densities are high. Guidelines are not provided for weed densities under light or heavy infestations. When in doubt as to the infestation level, use the high rate or contact the manufacturer.

Cost (2002 suggested retail price):

$4.52 to $5.99/acre in crop applications.

$5.99 to $9.45/acre for fall stubble and summer fallow.

$17.28/acre for pasture and rangeland.

Application Information:

Water Volume: Minimum 10 gallons/acre (45 L/acre) in cereals. Corn - 20 to 35 gallons/acre (90 to 160 L/acre).

Pressure: 30 - 40 psi (200 - 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crops under stress from excess moisture, drought or disease may suffer a setback when this herbicide is applied. Do not apply when temperature exceeds 27°C or when relative humidity is high. Stubble treatments for thistle control in fall should be made at least 2 weeks prior to killing frost.

Do not apply DyVel DS at wind speed greater than 5 mph (8 km/hr).

Tank Mixes:

Herbicides:

In corn:
Atrazine.

In spring wheat (NOT including durum):
Everest – 17.4 g/acre plus non-ionic surfactant

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the DyVel DS label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or harvest for livestock feed within 30 days of application. Do not permit lactating dairy animals to graze fields within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Environment: If there are sensitive plants within 400 m, apply only when there is a light breeze away from the sensitive area. Do not contaminate wetlands or water used for domestic or livestock consumption, irrigation or natural habitat.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison

Eclipse

Herbicide Group – 4, 9

(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

Eclipse A: 360 g/L clopyralid formulated as a solution.

Eclipse B: 360 g/L glyphosate present as an isopropylamine salt and formulated as a solution.

Container size – Each case will treat 30 acres and will consist of 3 split jugs (10 acres/jug). Each split jug will contain 1.12 L of Eclipse A and 5 L of Eclipse B.

Crops and Staging:

Glyphosate tolerant (Roundup Ready) canola varieties only in the 2 to 6 leaf stage. Some yellowing may occur when applied at the 4 to 6 leaf stage.

This effect is temporary and will not influence crop growth, maturity or yield.

Weeds:

No staging is specified on the label.

Annual grasses:

Green foxtail
Wild oat
Volunteer barley
Volunteer wheat

Annual broadleaf weeds:

Chickweed
Cleavers
Corn spurry
Cow cockle
Hemp nettle
Kochia
Lady's-thumb
Lamb's-quarters
Night-flowering catchfly
Redroot pigweed
Russian thistle
Shepherd's-purse
Smartweed
Stinkweed
Wild buckwheat
Wild mustard
Volunteer canola*
Wild tomato

Perennial weeds (season long control):
Canada thistle
Dandelion less than 15 cm diameter**
Dandelion greater than 15 cm diameter***
Perennial sow-thistle**
Quackgrass

* not including glyphosate tolerant (Roundup Ready) varieties
** top growth only
*** Suppression only.

Cost (2002 suggested retail price).:

$15.90/acre.

Rates:

Apply Eclipse A at 0.112 L/acre and Eclipse B at 0.5 L/acre or 10 acres/jug (30 acres/case).

To prepare spray solution, add Eclipse A to the spray tank. Once it is half filled with water, add Eclipse B as the remaining water is added to the tank.

Application Information:

Water Volume: 10 gal acre (45 L/acre)

Pressure: 30 to 40 psi (200 to 275 kPa)

Nozzles: Use nozzles that give even coverage without producing small droplets that are prone to drifting. Do not use with galvanized sprayer tanks since explosive hydrogen gas can be produced.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not treat weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result. Control may also be reduced when treated weeds are heavily covered with dust.

Tank Mixes:

Herbicides: None registered

Fertilizers: None registered

Insecticides: None registered

Restrictions:

Rainfall: Heavy rainfall immediately after application may wash the chemical off the foliage. Do not apply if rainfall is forecast for the time of application.

Grazing: Allow 3 to 5 days before grazing treated areas.

Preharvest Interval: Do not apply beyond the recommended staging.

Recropping: Wheat, oats, barley, rye (not underseeded to legumes such as alfalfa and clover), forage grasses, flax, canola and mustard can be grown the year after application. Apply manure bedded with straw from treated crops only to the crops listed above.

Aerial application: Do not apply by air.

Storage: Store in heated storage; if products are frozen, bring to room temperature and agitate before use.

Environment: Avoid drift onto sensitive plants and contamination of water or wetland areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

☠ Caution Poison -Eclipse A

Skin and Eye Irritant - Eclipse B

Edge

Herbicide Group – 3
(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

5 percent ethalfluralin formulated as a granular. Container size - 25 kg or 544 kg.

Crops and Staging:

Edge can be applied prior to seeding the following crops:

Seedling alfalfa (seed production only)
Canola
Caraway
Coriander
Dry beans (white or kidney)
Fababeans
Lentils (fall application only)
Mustard (yellow only)
Peas
Safflower
Soybeans
Sunflowers

Weeds and Staging:

For pre-emergent control of the following weeds:

Grasses Controlled:
Wild oats
Yellow foxtail
Barnyard grass
Green foxtail
Volunteer spring wheat
Crabgrass

Broadleaf Weeds Controlled:
Chickweed
Cow cockle
Corn spurry
Kochia
Lamb's-quarters
Prostrate pigweed
Purslane
Redroot pigweed
Wild buckwheat

Weeds Suppressed:
Cleavers
Hemp-nettle
Lady's-thumb
Nightshade
Russian thistle
Volunteer barley

Rates:

	RATE (KG/ACRE)				
	LIGHT TEXTURED SOILS		MEDIUM TO HEAVY TEXTURED SOILS		
TIME OF APPLICATION	2-6% Organic Matter/Dark Brown-Black	6-15% Organic Matter Deep Black	2-4% Organic Matter Dark Brown	4-6% Organic Matter Black	6-15% Organic Matter Deep Black
Spring	6.9	8.9	6.9	8.9	8.9 - 11.3
Fall *	8.9	11.3	8.9	11.3	11.3

* To conserve crop residue, one incorporation may be completed in the fall and the second incorporation completed in the spring prior to planting.

Do not apply Edge to peat soils, soils containing less than 2 percent organic matter or soils containing greater than 15 percent organic matter. Application to eroded knolls or grey-wooded soils with highly variable texture or organic matter may result in reduced crop stand, delayed development or reduced yields in either the treated or rotational crop. To reduce the possibility of injury to the treated crop, use good quality certified seed. Seed shallow into a warm, moist, firm seedbed using recommended agronomic practices that will promote rapid and even crop germination and emergence.

Special instructions for lentils:
Edge is registered for use on lentils for fall application only. One incorporation must be completed in the fall. Seeding depth is critical - do not seed more than 1.5 inches (4 cm) deep. Avoid loose seedbeds and planting into cold soils.

Cost (2002 suggested retail prices):
$14.28 to $23.39/acre.

Application Information:

Equipment: Apply Edge Granular using a calibrated granular applicator.

Incorporation: Two incorporations are required at right angles for thorough mixing. The first incorporation must be completed within 24 hours of application. When using the granular formulation, delay the second incorporation for at least three days after the first. If applying Edge granular in the fall, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve trash; however, both incorporations must be done to the same depth.

Incorporate with a tandem disc, discer or field cultivator (Vibrashank type). A cultivator should have 3 to 4 rows of sweeps spaced 8 inches apart and staggered so that no soil is left unturned. Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crops stressed by cold weather, excessive moisture or drought may be injured by Edge. Dry soil conditions between application and emergence may result in decreased weed control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze or cut treated crops for livestock feed prior to crop maturity.

Recropping: Red beets, oats, canaryseed and small-seeded grasses may be affected the year after treatment. Damage to wheat may occur if the crop is seeded onto land that has been treated with broadleaf weed control rates of trifluralin or Edge for 2 consecutive crop years. Thinning of crop may occur in areas that have received abnormally low amounts of precipitation or in crops that are emerging slowly.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. Edge Granular may be frozen. Do not expose to prolonged sunlight or heat.

Environment: Toxic to fish and other aquatic organisms. Do not contaminate water bodies or wetland areas.

Tank Cleaning:

Refer to page 14.

Embutox 625/Cobutox 600/Caliber 400

See 2,4-DB page 49.

Eptam 8-E

Herbicide Group – 8
(Refer to page 27)

Company:

Syngenta

Formulation:

800 g/L of EPTC formulated as an emulsifiable concentrate. Container size - 10 L.

Caution:

The level of weed control will be reduced where Eptam 8-E is used on soils that have been treated with Eradicane or Eptam 8-E the previous growing season. It is expected that the reduction in control will be greater where Eradicane or Eptam 8-E have been used repeatedly for 2 or more years.

Crops and Staging:

Eptam is applied as a preplant incorporated treatment.

Field Crops:

Dry beans	Potatoes
Flax	Sunflowers

Seedling Forage Legumes for Seed or Forage:

Alfalfa	Bird's-foot trefoil

NOTE: The use of Eptam 8-E on flax is not recommended in Saskatchewan because of the risk of crop injury.

Weeds and Staging:

Must be applied prior to the emergence of the following weeds. Emerged weeds will not be controlled.

- Barnyard grass
- Chickweed
- Corn spurry
- Green foxtail
- Hairy nightshade
- Henbit
- Lamb's-quarters
- Nettleleaf goosefoot
- Purslane
- Pigweed (prostrate, redroot, tumble)
- Volunteer cereals (wheat, barley, oats)
- Yellow foxtail
- Yellow nutsedge

Cost (2002 suggested retail price):
$11.33/L.

Rates:

CROP	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Dry and snap beans	1.72 - 2.23	5.8 - 4.5
Seedling alfalfa, seedling bird's-foot trefoil, sunflowers	1.72	5.8
Potatoes	1.72 - 3.44	5.8 - 2.9
Flax	1.42 - 1.72	7.0 - 5.8

Where a rate range appears, use the lower rate on light textured soils and the higher rate on heavy textured soils. Do not use on soils with less than 3 percent organic matter or more than 15 percent organic matter.

Application Information:

Water Volume: Minimum of 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Equipment and Nozzles: Since Eptam 8-E is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil)..

Incorporation:

All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application preferably during the spraying operation as Eptam 8-E is volatile. Set disc and cultivator implements to cut to a depth of 4 to 6 inches (10 to 15 cm). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device that extends beyond the width of the implement. Speeds in excess of 5 mph (8 km/h) will result in excessive pulverization and trash destruction leaving the field susceptible to erosion. The maximum recommended tillage depth is 4 inches (10 cm).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop injury can occur if stressful environmental conditions (cold, wet soils, drought or excessive heat) prevail after seeding. To minimize crop injury, delay seeding 10 days if these conditions prevail at the time of application, or select an alternative product. Very cold or dry soil conditions during weed emergence will reduce control.

Tank Mixes:

Herbicides:

In Potatoes - Sencor 75 DF.
Do not use on red skinned potatoes, early varieties or on Belleisle, Tobique, or Shepody varieties.
Do not use on soils with greater than 7 percent or less than 2 percent organic matter. Refer to Sencor for cropping restrictions and specific rate information.

In Dry beans (white and red kidney only) - Liquid formulations of Treflan and Rival.

Fertilizers: May be mixed with liquid fertilizer.

Compatibility test should be conducted according to instructions on the herbicide label.

Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with Eptam 8-E. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1/2 inch (1.5 cm) depth. The first incorporation must be done immediately after application.

Insecticides: Do not tank mix with insecticides.

Note: The above mixes are those listed on the Eptam label only. For addition mixes see the blue chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze or feed treated crops to livestock in the year of application.

Recropping: Will not injure crops the year after spring application.

Aerial Application: No labelled restrictions. However, since this product must be incorporated within seconds of application, aerial applications are impractical.

Storage: May be frozen.

Environment: Do not apply within 15 m of fish bearing waters or wildlife habitat.

Soil Type: Do not use on soils with less than 3 percent organic matter as crop injury will result.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Eradicane 8-E

Herbicide Group – 8
(Refer to page 27)

Company:

Distributed by Norac Concepts Inc.

Formulation:

800 g/L of EPTC (plus safener) formulated as an emulsifiable concentrate.

Container size - 10 L.

Caution:

The level of weed control will be reduced where Eradicane 8-E is used on soils that have been treated with Eradicane 8-E or Eptam 8-E the previous growing season. It is expected that the reduction in control will be greater where Eradicane 8-E or Eptam 8-E has been used repeatedly for 2 or more years.

Crops and Staging:

Corn (field and silage). Eradicane is applied as a preplant incorporated treatment.

Weeds and Staging:

Must be applied prior to the emergence of the following weeds. Emerged weeds will not be controlled.

Barnyard grass
Chickweed
Corn spurry
Green and yellow foxtail
Hairy nightshade
Henbit
Lamb's-quarters
Pigweed (prostrate, redroot, tumble)
Purslane
Quackgrass (suppression)
Volunteer cereals (wheat, barley, oats)
Wild oats
Yellow nutsedge

Rates:

USE	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Annual weed control in light textured soils	1.72	5.8
Annual weed control in heavy textured soils	2.23	4.5
Quackgrass suppression	3.44	2.9

Cost (2002 suggested retail price):

$16.68 to $33.36/acre.

Application Information:

Water Volume: Minimum of 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Equipment and Nozzles: Since Eradicane 8-E is highly volatile, the product must be incorporated immediately. This is best accomplished by mounting spraying equipment directly onto the incorporation equipment (tandem disks, field cultivators on light soil).

Incorporation:

All growth and stubble should be thoroughly worked into the soil before treatment. Apply to a dry soil surface. Incorporate immediately after application, preferably during the spraying operation, as Eradicane 8-E is volatile. Set disc and cultivator implements to cut to a depth of 4 to 6 inches (10 to 15 cm). A second operation at a right angle to the first is required. The disc or cultivator must be followed with a harrow or other levelling device that extends beyond the width of the implement.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Poor weed control may result if soils are wet during incorporation.

Crop injury may result if soil is cold and wet during germination and emergence. Hot, dry conditions during germination and early crop growth may also lead to crop injury.

Tank Mixes:

Herbicides: Atrazine, Bladex or Dual II.

Fertilizers: Dry bulk fertilizers, except nitrate fertilizers, may be impregnated or coated with Eradicane 8-E. The impregnated fertilizer should be spread uniformly onto the field using a double overlap pattern immediately after impregnation. The impregnated fertilizer must be applied to the field when the soil surface is dry to at least 1/2 inch (1.5 cm) depth. The first incorporation must be done immediately after application.

May also be mixed with liquid fertilizer. Conduct a compatibility test prior to mixing in tank. See label for instructions on conducting a compatibility test.

Insecticides: Do not tank mix with insecticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No effect once incorporated.

Grazing: Do not graze treated crops or cut for feed prior to ear emergence.

Recropping: Will not injure crops the year after spring application.

Aerial Application: No labelled restrictions, however, since this product must be incorporated within seconds of application, aerial applications are impractical.

Storage: May be frozen.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Escort

Herbicide Group – 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

60 percent metsulfuron methyl formulated as a dry flowable. Container size - 0.25 kg.

Crops and Staging:

Pasture, rough turf, and rangeland.

No stage restrictions.

Weeds, Rates and Staging:

For seedling weeds apply to young plants up to 4 inches (10 cm) tall or wide. For established non-woody plants (biennial or perennial) apply up to the early bud stage. For western snowberry and wild rose apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

Rate	Weeds Controlled	
8 g/acre	Canada thistle* Dandelion* Russian thistle Sow-thistle*	Common tansy Kochia Scentless chamomile Sweet Clover
10 g/acre	Above weeds plus: Canada thistle* Sow-thistle*	 Dandelion* Western snowberry
12 g/acre	Above weeds plus: Wild rose Canada thistle*	 Dandelion Sow-thistle*

At all rates add Agral 90, Agsurf, or Citowett at 0.2 L per 100 L of spray solution.

*Suppression only.

Cost (2002 suggested retail price):

$12.80 to $19.20/acre.

Application Information

Water Volume: 10 to 20 gallons/acre (45 to 90 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply during periods of intense rainfall or to soil saturated with water. Warm, moist conditions following treatment enhance the activity of Escort, while cold, dry conditions may reduce or delay activity. Brush hardened off by cold weather and drought stress may not be controlled.

Tank Mixes:

Herbicides: 2,4-D amine or ester at 0.79 L/acre (500 g/L formulations) plus surfactant.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: May be grazed on the day of treatment.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

Escort can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Escort should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with 1 L of 3 percent household ammonia per 100 L of water. All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

For additional information, refer to page 14.

Hazard Rating:

Caution Eye Irritant

Estaprop/Turboprop 600/Dichlorprop-D

See Dichlorprop + 2,4-D page 89

Ethrel – Growth Regulator

Herbicide Group – 1
(Refer to page 27)

Company:

Bayer CropScience

Formulation:

240 g/L ethephon formulated as a solution.

Container sizes – 4.54 L, 10 L

Crops and Staging:

To reduce the risk of lodging in spring wheat (not including durum) and barley. Apply from the emergence of the flag leaf to the swollen boot stage. Do not apply if more than 10% of awns are showing. Application outside of recommended stages may result in poor results or crop injury. Maturity may be delayed up to 5 days. Refer to the label for more details on staging.

Note: Lodging in cereals results from the selection of long stemmed varieties in high fertility, high moisture situations. If lodging is a continuing problem in cereal crops, the use of varieties resistant to lodging and a fertility program based on soil test recommendations should be considered.

Effect of Growing Conditions and Rates:

If fertility levels are less than 89 lbs./acre (40 kg/acre) of actual nitrogen and combined annual precipitation through the growing season or is less than 10 inches of rainfall or 14 inches of irrigation apply at 0.4 L/acre. If combined fertility and moisture conditions are greater than those given, 0.5 L/acre may be used in dryland crops, 0.6 L/acre may be used in irrigated spring wheat and 2-row barley and 0.8 L/acre may be used in irrigated spring barley. Do not use greater than 0.5 L/acre unless crops are irrigated.

To avoid sprayer corrosion, spray mixtures may not sit overnight. Do not apply to crops that are under stress from excessive drought, moisture, heat, disease, or crops that have already lodged. Do not use any adjuvants. If applied to irrigated crops irrigation must be continued until the hard dough stage or yield loss may result from moisture stress.

Cost (2002 suggested retail price):

$8.22 to $16.44/acre

Application Information:

Water Volume:

Ground application: 10 to 27 gal/acre (40 to 120 L/acre)

Aerial application: A minimum of 2.7 gal/acre (12 L/acre).

Pressure:

Ground application: 40 psi (275 kPa)

Aerial application: 42 psi (300 kPa)

Nozzles:

Ground application: Flat fan nozzles. Suitable applicators include truck mounted sprayers, tractor sprayers or high clearance trailer sprayers. Do not use flood jet nozzles, controlled droplet application equipment, Sprafoils, Spray Coupes, or floaters.

Aerial application: Use a combination of nozzles and pressure for a coarse droplet size distribution (400-800 microns).

How it Works:

Ethrel causes ethylene to be released in plant tissues, which reduces stem internode length by reducing cell elongation in plant stems. Stems with shorter internodes are less prone to lodging. Cereal stems can be reduced in height from 1 to 6 inches (2 to 15 cm) from an application of Ethrel.

Tank Mixes:

Herbicides: None registered

Fertilizers: None registered

Insecticides: None registered

Restrictions:

Rainfall: Within 5 hours may reduce effectiveness.

Grazing: Treated straw may be fed to livestock.

Preharvest Interval: Do not apply within 35 days of harvest.

Recropping: No restrictions in the year after application. Only one application may be made per year.

Aerial Application: May be applied by air.

Storage: Do not freeze.

Environment: Avoid drift onto non-target areas.

Tank Cleaning:

Refer to page 14. Equipment should be cleaned immediately after use to prevent corrosion damage. Ethrel will etch glass and plastic if left in contact for more than one hour. Clean windshields often.

Hazard Rating:

Danger Corrosive.

Eye and Skin Irritant.

Everest

Herbicide Group – 2

(Refer to page 27)

Company:

Arvesta

Formulation:

70% flucarbazone-sodium formulated as a water dispersible granule.

Container size - 4 x 174 g water-soluble packets.

Crops and Staging:

Spring wheat (including durum) with 1 leaf to a maximum of 4 main stem leaves plus 2 tillers (6 total leaves).

Everest MUST be tank mixed with a broadleaf partner for crop safety. Tank mix options are listed in the tank mix section.

Weeds, Rates and Staging:

Green foxtail at 8.7 g per acre (one packet treats 20 acres)

Wild oat at 17.4 g per acre (one packet treats 10 acres)

Apply from 1 leaf to a maximum of 4 main stem leaves plus 2 tillers (6 total leaves).

Check tank mix partner for any additional staging restrictions.

Add non-ionic surfactant (Agral 90, Agsurf, Surf 92, Superspreader, LI700) at 0.25 L per 100 L of spray solution. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Cost (2002 suggested retail price):

$7.56 to $15.05/acre, not including adjuvant and required tank mix partner.

Application Information:

Water Volume:

Spring wheat: 5 to 10 gallons/acre (20 to 45 L/acre)

Note: Only Agral 90 and Ag-Surf may be used at the 5 gal/acre water rate.

Durum wheat and reduced rate for green foxtail control: 10 gallons/acre (45 L/acre)

Pressure: 30 to 50 psi (200 to 345 kPa)

Nozzles: Flat Fan nozzles at 80° or 110°. Use of flood-jet or controlled droplet application equipment is not recommended.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or water-logged soil, drought, extreme temperatures, low fertility or visible disease symptoms at application.

Tank Mixes:

Herbicides:

Note: All mixes must be applied with a registered surfactant unless otherwise indicated.

In Spring wheat (including Durum):
2,4-D Amine or Ester at recommended rates up to 0.45 L/acre (500 g/L formulation)

In Spring Wheat (NOT including Durum):
Ally at 2 to 3 g/acre + 2,4-D amine or ester up to rates recommended above*3
Attain (label rate)*3
Buctril M at 0.4 L/acre
Curtail M (0.6 to 0.8 L/acre)*3

[1]DyVel (0.5 L/acre)*[Δ]
[1]DyVel DS (0.34 L/acre)*[Δ]
Estaprop at 0.71 L/acre
Express Pack (label rate)*
Frontline 2,4-D (label rate)*[Δ]
MCPA Amine or Ester at recommended rates up to 0.45 L/acre (500 g/L formulation)*
Pardner (0.4 L/acre)*
Prestige (labeled rate)*[Δ]
Refine Extra at 8 g/acre + 2,4-D (ester * or amine) at rates on this page.
[1]Target at 0.4 to 0.6 L/acre *[Δ]
Thumper 0.4 L/acre Unity 40 acres per case *
Unity (label rate)*[Δ]

* Registered for use with wild oat rate of Everest and with Agral 90 and Agsurf surfactants only

[Δ] Apply in 10 gallons per acre (45 L/acre) of water only.

[1] Wild oat control may be reduced with this mix.

Fertilizers: Do not use liquid fertilizer or products that contain boron or free chlorine with this product or water-soluble bags will become insoluble and potentially plug sprayers.

Insecticides: None

Note: The above mixes are those listed on the Everest label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall within 6 hours of application may reduce control.

Grazing: Do not graze treated fields. Mature grain or straw may be fed to livestock.

Preharvest Interval: Apply at least 80 days before harvest.

Recropping Interval: In Brown soils seed only spring wheat the year after application. In Black, Dark Brown, or Grey-Wooded soils, seed only spring wheat, barley, canola, field peas* or fallow the year after application.

* Field peas may be grown the year following Everest application in fields where precipitation has been equal to or above the 10 year average during the growing season, and where organic matter content is above 4%, and pH is below 7.5.

Aerial Application: Do not apply by air.

Storage: Store in closed original container in a cool, dry area away from fertilizers, food or feed. Handle frozen solupaks with care since they may be fragile at low temperatures.

Environment: Do not mix or load within 10 m of wellheads, sloughs, dugouts, ponds, marshes, ditches, streams, lakes, etc. Leave an unsprayed area of at least 20 m between treated areas and sensitive plants like shelterbelts and woodlots and at least 35 m between treated areas and well heads, sloughs, dugouts, ponds, marshes, ditches, streams, lakes, etc. Avoid drift onto sensitive crops like canola and tame oat.

Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining spray solution from the tank and pay special attention to any deposits. Fill the tank with clean water, adding household ammonia (3%) at 1 L per 100 L. Cycle this mixture through the equipment (minimum 15 minutes) and spray out. Fill the spray tank with clean water and cycle for five minutes. Clean pump and nozzle screens thoroughly in ammonia + water solution as above. Reinstall nozzles and repeat entire rinsing procedure. Wash any spilled spray mixture from the outside of the spray tank, nozzles and other machinery exposed while spraying.

Refer to page 14 for additional information.

Hazard Rating:

Keep out of reach of children

Express Pack/Express TNG

Herbicide Group – 2,4
(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

The Express Pack package contains 2 containers: one labelled Express TNG herbicide and one labelled 2,4-D LV Ester herbicide.

Express TNG herbicide: 75 percent tribenuron methyl, formulated as a dry flowable. Container size - 160 grams.

2,4-D herbicide: 660 g/L 2,4-D LV ester, formulated as an emulsifiable concentrate. Container size - 10 L.

Express TNG can also be purchased separately but must be used with 2,4-D Ester or another registered mix.

Crops and Staging:

Wheat (spring and durum), barley - 3 leaf up to emergence of the flag leaf.
Summerfallow.

Weeds and Staging:

Weeds controlled when treated at less than 4 inches (10 cm) tall or across, unless otherwise indicated:

Annual sunflower
Ball mustard
Canada thistle*
Cow cockle
Flixweed ***
Hare's-ear mustard
Indian mustard
Kochia (2 to 10 leaf)
Lamb's-quarters
Narrow-leaved hawk's beard***
Prickly lettuce
Redroot pigweed
Russian pigweed
Russian thistle
Shepherd's-purse***
Stinkweed***
Sweet clover
Thyme-leaved spurge
Tumble mustard
Wild mustard
Wild radish
Wormseed mustard
Wild buckwheat
(1 to 3 leaf)**

* Top growth control
** Suppression only
*** Fall rosettes and spring seedlings

Cost (2002 suggested retail price):

$4.42/acre.

Rate:

4 g/acre Express plus 0.24 L/acre 2,4-D LV Ester 700.

The Express Pack case will treat 40 acres.

Express may degrade if left in the sprayer for an extended period. Apply within 24 hours of mixing.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (210 to 275 kPa).

Nozzles: Flat fan nozzles with 50 mesh (or coarser) line strainers and screens

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply to wheat, durum or barley that are stressed by severe weather conditions (frost, drought or water saturated soil, extreme heat), as crop injury may result. Under certain conditions (such as heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures), lightening in crop colour and reduction in crop height may occur.

Tank Mixes:

Herbicides: Do not use Express TNG alone.

In spring wheat (including durum) and barley:
Express TNG + 2,4-D Ester + Assert.
Express TNG + 2,4-D Ester + Banvel II
Express TNG + 2,4-D Ester + Puma120 Super (green foxtail rate only)
Express TNG + MCPA Amine + Metribuzin (Sencor)

In spring wheat only:
Accord.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Express Pack label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check product labels for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours will reduce control.

Grazing: Do not graze or feed to livestock within 7 days of application.

Preharvest: Do not harvest forage or cut for hay within 30 days of application.

Recropping: No restrictions the year after treatment. Canola, flax, lentils and alfalfa may be planted 2 months after an application of Express Pack.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

Express can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Express should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water-household ammonia rinse (1 L of 3% ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

◈ Warning Poison

FlaxMax

Herbicide Group – 1, 4

(Refer to page 27)

Company:

BASF Canada

Formulation:

One case of FlaxMax Ultra contains 4 containers:

Poast Ultra: 450 g/L of sethoxydim formulated as an emulsifiable concentrate.
Container size - 3.65 L.

FlaxMax: 50 g/L clopyralid and 280 g/L MCPA ester formulated as an emulsifiable concentrate.
Container size – 2 x 8.1 L.

Merge adjuvant: 8.1 L jug.

Crops and Staging:

Flax - 2 to 6 inches (5 to 15 cm) in height.

Spraying at an early stage will reduce the risk of crop injury.

Weeds, Staging and Use Rates:

Poast Ultra at 0.13 L/acre, FlaxMax at 0.61 L/acre, and Merge at 0.3 L/acre (27 acres per case) will control the following weeds:			
Annual Grasses 1 to 6 leaf stage	**Annual Grasses 1 to 4 leaf stage**	**Annual Broadleaf Weeds 2 to 4 leaf stage**	**Perennial Weeds**
Barnyard grass, crabgrass, fall panicum, Persian darnel, proso millet, volunteer corn, green and yellow foxtail, witch grass	wild oat, volunteer barley, volunteer wheat	flixweed, lamb's-quarters shepherd's-purse stinkweed, volunteer sunflower, wild mustard	Canada thistle*

<table>
<tr><th colspan="4">Poast Ultra at 0.19 L/acre, FlaxMax at 0.81 L/acre, and Merge at 0.4 L/acre (20 acres per case)
will control the weeds listed above plus:</th></tr>
<tr><th>Annual Grasses 1 to 6 leaf stage</th><th>Annual Grasses 1 to 4 leaf stage</th><th>Annual Broadleaf Weeds 2 to 4 leaf stage</th><th>Perennial Weeds</th></tr>
<tr><td>wild oat,
volunteer barley,
volunteer wheat</td><td></td><td>annual sow-thistle
common groundsel,
redroot pigweed,
Russian pigweed,
scentless chamomile,
smartweed,
tartary buckwheat,
volunteer canola,
wild buckwheat</td><td>dandelion**,
perennial sow-thistle***
Canada thistle</td></tr>
</table>

* Apply from 10 cm until early bud stage. This treatment will provide season long control of light Canada thistle infestations with some regrowth in the fall.

** Apply at the spring rosette stage.

*** Top-growth control only.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Cost (2002 suggested retail price):

$19.28 to $26.03/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 35 to 40 psi (240 to 275 kPa).

Nozzles: Flat fan nozzles tilted forward at an angle of 45°.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

When weeds are stressed because of drought, flooding or prolonged hot or cool temperatures (15°C or less), control can be reduced or delayed since weeds are not actively growing. Weed escapes may occur under prolonged stress conditions or low fertility. Do not apply to weeds stressed longer than 20 days because of lack of moisture as unsatisfactory control can result. Do not apply to crops that are under stress from heat, drought, or cool conditions as crop injury may result.

Tank Mixes:

Herbicides: None registered.

Insecticides: None registered.

Fertilizers: None registered.

Restrictions:

Rainfall: Within six hours may reduce control.

Grazing: Do not graze the treated crop or cut for livestock feed.

Preharvest: Do not apply within 60 days of harvest.

Recropping: FlaxMax Ultra residues in the soil may affect subsequent crops. Leave a minimum of 14 days between application of FlaxMax Ultra and replanting of barley, wheat, oat, and flax. Cultivating to a minimum depth of 4 inches (10 cm) is recommended before reseeding. Wheat, barley, oat, rye, corn, flax, canola or mustard may be planted the year after application. Do not seed any other crop until 2 years after application.

Aerial Application: Do not apply by air.

Storage: Store above 5°C. If frozen, bring to room temperature and agitate before use.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Warning Poison

Warning Skin and Eye Irritant

Fortress*

Herbicide Group – 3,8
(Refer to page 27)

Company:

Monsanto Canada Inc.

*Fortress is no longer being manufactured and this page may be removed from the 2004 Guide to Crop Protection.

Formulation:

10 percent triallate and 4 percent trifluralin formulated as a granular.

Container size - 22.7 kg bag, 454 kg container.

Crops and Staging:

Prior to planting wheat (spring and durum), barley, canola, flax (not including Solin), mustard.

Preplant incorporated: In fall after September 15 until soil freeze-up or in the spring prior to seeding crop.

Surface application: Apply in the fall after October 1 and when soil temperature is less than 4°C at a 2 inch (5 cm) depth and delay incorporation until the following spring.

Do not apply to fields with heavy trash cover or after snow has fallen. Some wheat or barley injury may be noted on eroded knolls.

Weeds and Staging:

Pre-emergent control of wild oats, green foxtail, yellow foxtail.

Suppression of lamb's-quarters, kochia, redroot pigweed, Russian thistle, wild buckwheat.

Cost (2002 suggested retail price):

$13.93 to $21.53/acre.

Rates:

Apply Fortress according to soil organic matter content.

ORGANIC MATTER	RATE (KG/ACRE)					
	RAPESEED (CANOLA), FLAX, MUSTARD		BARLEY		SPRING WHEAT AND DURUM WHEAT	
	Spring	Fall	Spring	Fall	Spring	Fall
< 2%	5.67	5.67	N.R.*	4.45	N.R.*	N.R. *
2 - 4%	5.67	5.67	4.45	5.67	N.R.*	4.45
4 - 6%	6.88	5.67	5.67	5.67	4.45	5.67
> 6%	6.88	6.88	6.88	6.88	5.67	5.67**

* N.R. - Not Recommended.

** For fall incorporated applications (not surface) apply 6.88 kg/acre when organic matter exceeds 8 percent.

Application Information:

Fortress may be applied in the fall with or without a fall tillage operation, or in the spring as a preplant incorporated treatment. Before application of this product, the soil must be in good working condition. Application to a field that is wet, lumpy, rough or ridged will result in reduced weed control and promote crop thinning.

Fall Surface Application: Where fields are prone to water and/or wind erosion, and tillage is therefore undesirable, fall surface application should be made when the soil begins to cool (less than 4°C) and within 3 weeks of soil freeze-up, which usually occurs by October 1. Application can be made to standing stubble or to previously worked fields with incorporation delayed until spring. For best results on heavy wild oat infestations, use the incorporated treatment.

Fall Incorporated Application: Fortress must be applied after September 15 and before soil freeze-up. Application prior to September 15 may result in reduced weed control. An incorporation may be completed within 24 hours of application. The second incorporation may be done in the fall (prior to soil freeze-up) or in the spring prior to, or after, seeding. If performed after seeding, it must be completed with harrows prior to emergence of the crop. Fall incorporation is not recommended on soils where a lack of trash cover combined with the required incorporation operation could result in soil erosion.

Spring Application: Fortress can be applied before seeding but must be incorporated within 24 hours of application. The second incorporation must be delayed at least 48 hours after the first and may be performed at any time prior to crop emergence.

Incorporation:

Fortress applications require two incorporations, with the second incorporation at right angles to the first. Seeding with a seeder that provides soil disturbance equivalent to a cultivator may replace one incorporation. Incorporate to a maximum depth of 2 inches (5 cm) by setting disk or cultivator implements to cut a maximum of 3 inches (7.5 cm) into the soil. Mixing the product to greater depths will dilute the herbicide, decrease wild oat control, and may cause injury to cereals. If the second incorporation is conducted after seeding, it should be done with harrows or other suitable tillage equipment adjusted so as not to disturb the seed. Harrowing does not provide effective incorporation if compact soil prevents penetration of harrow teeth, if trash accumulates in the harrow sections, or if the harrows bounce.

Seeding Requirements:

Accurate seeding depth control is critical. Thinning of wheat and barley has been known to occur when seeding depth has been inadequate. Ensure that cereals are seeded below the treated layer (2 to 3 inches or 5 to 7.5 cm). Do not seed deeper than 3 inches (7.5 cm). To ensure an even crop stand, increase the usual seeding rate of wheat or barley by 10 percent, especially if soil conditions are cold or dry. See product label for more information.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop injury can occur on fields where Fortress has been applied and heavy rainfall or cold weather occur after seeding but prior to crop emergence. Seeding under warm soil conditions (greater than 10°C and generally after May 15) will ensure optimum crop germination and emergence and will reduce the risk of crop injury. Very dry conditions in spring or prolonged cool soil temperatures at time of wild oat germination will result in reduced control.

Poor results may be expected from incomplete incorporation due to wet, cloddy soil or heavy trash. Ridges left at seeding may disrupt the treated layer and allow weed escapes.

Restrictions:

Rainfall: Moisture is required for activation. Rainfall of at least 0.6 inches (1.5 cm) within 2 weeks of seeding is required to ensure optimum results.

Grazing: Do not graze or cut treated crops for livestock feed prior to crop maturity.

Recropping: Fortress will leave a residue in the soil. Oats, canaryseed, and small seeded forage grasses may be injured if planted within 24 months of application. Do not apply Fortress on land to be sown to wheat if the land has been treated with trifluralin since June 1 of the previous year.

Aerial Application: May be applied by airplane with attachments designed for applying low volumes of granules.

Storage: Store in a cool, dry place.

Hazard Rating:

Skin and Eye Irritant

Freedom Gold

Herbicide Group – 1, 2
(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

Freedom Gold contains 2 components in each case:
Freedom – 75 percent thifensulfuron methyl as a water dispersible granule.
Container size – 1 x 320 g

Assure II – 96 g/L quizalofop-p-ethyl as an emulsifiable concentrate.
Container size – 1 x 8 L

Sure-mix adjuvant. Container size – 1 x 8 L

Crops and Staging:

CLEARFIELD canola varieties 45A71, 46A73, 46A74, 46A76 only. Consult manufacturer on CLEARFIELD varieties not listed.

Application of Freedom Gold to canola varieties without the CLEARFIELD trait will result in ***crop death.***

Freedom – 3 to 6 leaf stage prior to bolting. Do not apply before the 3 leaf stage. Application to crops prior to this stage, or with uneven germination, may result in crop injury.

Caution: Testing on 46A76 has shown that to maximize crop tolerance, do NOT apply prior to the 4 leaf stage.

Assure II – No leaf stage restrictions but must be applied more than 74 days prior to harvest.

Application of Freedom and Assure II together as a tank mix may result in temporary crop yellowing or delay in flowering. Assure II plus Sure-Mix may be applied prior to the 3 leaf stage. A follow up treatment of Freedom plus non-ionic surfactant may be applied after the 3 leaf stage.

Weeds, Rates and Staging:

Grasses:
Assure II Rate: See chart below.

WEED	ASSURE II RATE (L/ACRE)	STAGE
Wild oat*	0.15	1 to 5 leaf prior to tillering
	0.20	up to 2 tillers
Barnyard grass, Green foxtail, Volunteer barley, oat & wheat	0.15 to 0.20	2 leaf to early tillering
Volunteer corn	0.15 to 0.20	2 to 6 leaf stage
Quack grass**	0.20	2 to 6 leaf stage

Broadleaf Weeds:
Freedom rate: 8 grams per acre
Broadleaf weeds – up to 10 cm (4 inches) unless otherwise indicated.

Chickweed (1 to 6 leaf)
Corn spurry
Cow cockle
Green smartweed
Hemp-nettle
Lady's-thumb
Lamb's-quarters
Redroot-pigweed
Russian thistle
Stinkweed
Volunteer canola
 (except CLEARFIELD
 varieties)
Kochia**
Wild buckwheat (1 to 3 leaf)
Wild mustard

* Best results when applications made prior to tillering.
** Suppression only

Adjuvant: For the Freedom Gold tank mix use Sure-Mix at 5 L per 1000 L of spray volume.

For a split application Assure II must be applied as above with Sure-Mix. Freedom may be applied with Sure-Mix as above or with a non-ionic surfactant such as Agral 90, Agsurf or Cittowet at 2 L per 1000L of spray volume.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Cost (2002 suggested retail price):

$21.95/acre, including adjuvant.

Appliction Information:

Water Volume: 10 gallons/acre (45 L / acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat Fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

For the effects of growing conditions on Assure II see Assure II (page 66).

Temporary crop yellowing or delay in flowering may occur with normal applications of Freedom Gold. Freedom Gold applied to crops that have been under stress before application may result in crop injury. Stress conditions within 3 days of application may also result in crop injury. Weeds under stress conditions at the time of application may not be adequately controlled. Stress conditions include prolonged cool periods, frost, low fertility, drought, water-saturated soils, and disease or insect damage. Injury symptoms can be crop discoloration (yellowing, purpling or reddening), stunting, or delay in flowering.

Tank Mixes:

Herbicides: Lontrel at 0.17 L/acre. Include Sure-Mix.

Fertilizers: None

Insecticides: None

Restrictions:

Rainfall: ***Freedom*** - Several hours of dry weather are needed after application of Freedom to allow uptake by the plants. Broadleaf weed control may be reduced if rain-fall occurs soon after application.

Assure II - Rainfall within one hour may reduce grass control.

Grazing: Must not be grazed or fed to livestock within 74 days of application.

Preharvest Interval: Must not be harvested within 74 days of application.

Recropping Interval: Do not plant any crop other than wheat or barley for 30 days after application.

Aerial Application: Do not apply by air.

Storage: Store in closed original container in a dry area away from food or feed.

Environment: Do not apply within 15 m of water bodies, wetlands or sensitive plants.

Tank Cleaning:

Freedom can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Freedom should be flushed out immediately after Freedom is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with an ammonia rinse (1L of 3% ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned separately during the cleaning process.

Refer to page 14 for additional information.

Hazard Rating:

Assure II:

Danger – Corrosive to eyes

Warning – Skin Irritant. Potential skin sensitizer.

Freedom:

Warning – Eye and Skin Irritant

Frontier

Herbicide Group – 15
(Refer to page 27)

Company:

BASF Canada

Formulation:

900 g/L dimethanamid formulated as an emulsifiable concentrate. Container size - 10 L

Crops and Staging:

Pre-plant incorporated:
Corn (not sweet corn, popcorn, or corn grown for seed)
Dry beans (white and kidney beans only)

Pre-emergence surface:
Dry beans (white and kidney beans only).

Weeds and Staging:

Pre-emergent control of green foxtail.

Rates:

Pre-plant incorporated treatments: Apply at 0.51 to 0.57 L/acre. Apply at the higher rate on fine-textured or high organic soils and for heavier anticipated weed problems.

Pre-emergence treatments:

SOIL TYPE	RATE (L/ACRE)		
	Less than 3 Percent Organic Matter	**3 to 6 Percent Organic Matter**	**7 to 10 Percent Organic Matter**
Coarse Textured Soils	0.45	0.45	0.51
Medium and Fine Textured Soils	0.45	0.51	0.57

Cost (2002 suggested retail prices):

$18.23 to $23.08/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 45 psi (200 to 300 kPa).

Nozzles: Flat fan. Use 16 mesh suction screen, 50 mesh elsewhere on sprayer.

Incorporation: For pre-plant incorporated treatments, apply Frontier as a broadcast treatment and incorporate using a harrow, rolling cultivator or other implement capable of giving uniform, shallow incorporation into the top 5 cm (2 inches) of soil within 7 days of planting. Avoid deeper incorporation or reduced weed control and/or crop injury may result. Immediate incorporation after application is not necessary.

Beans must be planted at least 4 cm (1.5 inches) deep or crop injury may occur.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Rainfall is required within 7 to 10 days of application to activate and move Frontier into the soil zone. If dry conditions persist, a shallow cultivation or the use of a rotary hoe is necessary to move the herbicide into moist soil and control weed escapes. Shallow tillage is important to minimize dilution of the herbicide. If drought conditions persist after pre-plant incorporated or pre-emergence applications, weed control may not be adequate.

Tank Mixes:

Herbicides: None registered.

Fertilizers: May be applied with a liquid fertilizer carrier. Test compatibility of Frontier with liquid fertilizer by mixing a small amount of herbicide with a proportional quantity of liquid fertilizer in a jar. May also be impregnated on dry bulk fertilizers for pre-plant incorporated treatments. A minimum of 90 kg/acre of dry bulk fertilizer should be applied. Do not impregnate Frontier on nitrate fertilizers, superphosphates or limestone.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall after application is important for good weed control.

Grazing: Do not graze or feed the treated corn crop within 40 days of application. Do not graze the treated bean crop or feed bean forage, hay or straw to livestock.

Recropping: Do not plant winter wheat within 120 days of application.

Aerial Application: Not registered.

Storage: Do not freeze. Must be stored under heated warehouse conditions.

Environment: Avoid drift onto non-target plants. Leave a buffer of 15 meters from water bodies and wetland areas.

Tank Cleaning:

The manufacturer does not provide information on tank cleaning. Generally, a mixture of water and household ammonia (1 L per 100 L of water) flushed twice through the tank and circulated through the lines and nozzles is an effective method of cleaning the sprayer tank.

Hazard Rating:

▽ Caution Poison.

Warning Eye Irritant and Potential Skin Sensitizer.

Frontline 2,4-D

Herbicide Group – 2, 4

(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

Each case of Frontline 2,4-D contains 2 components:

Frontline 2,4-D A: 50 g/L florasulam formulated as a suspension concentrate

Frontline 2,4-D B: 564 g/L 2,4-D LV ester formulated as an emulsifiable concentrate.

Container sizes – Frontline 2,4-D A - 1.6 L, Frontline 2,4-D B – 2 x 8 L.

Crops and Staging:

Spring wheat (including durum) in the 3 to 6 leaf stage.

When mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Broadleaf weeds controlled at the 2 to 4-leaf stage:

Bluebur
Burdock
Chickweed
Cleavers
Cocklebur
Dandelion*
Flixweed
Kochia**
Lady's-thumb
Lamb's-quarters
Mustards
Plantain
Prickly lettuce
Ragweed (common)
Redroot pigweed
Russian thistle
Shepherd's-purse
Smartweed
Sow-thistle (annual)
Stinkweed
Sunflower (annual)
Tartary buckwheat
Vetch
Volunteer canola***
Wild buckwheat
Wild mustard
Wild radish

Broadleaf weeds suppressed:

Canada thistle (top growth control only)
Hemp-nettle
Perennial sow thistle (top growth control only)
Stork's-bill

* Seedlings and overwintered rosettes

** Up to 5 cm (2 inches) in height.

*** Including all herbicide-tolerant canola varieties

Cost (2003 suggested retail price):

$6.10/acre.

Rate:

Frontline 2,4-D A: 0.04 L (40 mL)/acre

Frontline 2,4-D B: 0.4 L (400 mL)/acre.

One case treats 40 acres.

Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13 of the Guide to Crop Protection.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Use nozzles capable of delivering appropriate pressures and volumes.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of Frontline 2,4-D Tank-Mix. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at or following time of application may reduce weed control and increase the risk of crop injury at all stages of growth.

Tank Mixes:

Herbicides:

In spring wheat:

Everest (17.4 g/acre) plus non-ionic surfactant.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Frontline 2,4-D label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest forage or cut hay within 30 days of application.

Pre-harvest Interval: Do not apply within 60 days prior to harvest mature crop.

Recropping: Wheat, barley, canola and peas may be grown the year following an application.

Aerial Application: Do not apply by air.

Storage: Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

Environment: Leave a buffer zone of at least 30 m between the downwind edge of the boom and the closest edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrublands. A buffer zone of at least 15 m is required between the downwind edge of the boom and the closest edge of aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison.

May cause skin and eye irritation

Frontline

Herbicide Group – 2, 4
(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

Each case of Frontline will contain 2 jugs:

Frontline A: 50 g/L florasulam formulated as a suspension concentrate. Container size- 1.6 L

Frontline B: 500 g/L MCPA Ester formulated as an emulsifiable concentrate. Container size- 13.4 L.

Crops and Staging:

Spring wheat (including durum), barley and oats in the 2 to 6 leaf stage.

When tankmixing, always check the tankmix partner recommendations for additional staging restrictions.

Weeds and Staging:

Broadleaf weeds controlled at the 2 to 4-leaf stage:

Ball mustard
Chickweed
Cleavers
Hemp-nettle
Lamb's-quarters
Ragweed (common)
Redroot pigweed
Shepherd's-purse
Smartweed
Stinkweed
Volunteer canola (all varieties)*
Wild mustard
Wild buckwheat

Broadleaf weeds suppressed:

Canada thistle**
Dandelion***
Stork's-bill
Sowthistle (annual)
Sowthistle (perennial) **

* including all herbicide-tolerant canola varieties
** top growth control
*** seedlings and overwintered rosettes less than 15 cm (6 inches)

Cost (2002 suggested retail price):

$7.12/acre.

Rate:

Frontline A: 40 mL/acre

Frontline B: 335 mL/acre

One case treats 40 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Use nozzles capable of delivering appropriate pressures and volumes.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of Frontline. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at or following time of application may increase the risk of crop injury at all stages of growth.

Tank Mixes:

Herbicides:

In spring wheat (including durum) and barley only:
Assert at 0.65 L/acre plus Acidulate.
Puma120 Super at 0.31 L/acre.

In spring wheat (including durum) only:
Horizon at 0.095 L (95 mL)/acre or 0.115 L (115mL)/acre plus Score Adjuvant.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Frontline label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for feed within 7 days of application.

Pre-harvest Interval: Do not apply within 60 days of harvest.

Recropping: Wheat, barley, oats, canola and peas may be grown the year following an application:

Aerial Application: Do not apply by air.

Storage: Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

Environment: Leave a buffer zone of at least 30 m between the downwind edge of the boom and the closest edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrublands. A buffer zone of at least 5 m is required between the downwind edge of the boom and the closest edge of aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

☠ Caution Poison

May cause slight eye irritation

Fusion

Herbicide Group – 1

(Refer to page 27)

Company:

Bayer CropScience

Formulation:

One case of Fusion contains:

Component 1: 80.5 g/L fenoxaprop-p-ethyl.
Container size - 3.7 L.

Component 2: 125 g/L fluazifop-p-butyl.
Container size - 6.5 L.

Both components are formulated as emulsifiable concentrates.

Crops and Staging:

Crops are tolerant at all stages but the following preharvest restrictions apply:

CROP	STAGING
Canola	Do not apply beyond the 5 leaf stage, 80 day preharvest interval
Flax (including Solin)	Tolerant at all growth stages, 80 day preharvest interval
Field peas	Tolerant at all growth stages, 75 day preharvest interval
Lentils	Do not apply beyond the 6 node stage, 82 day preharvest interval
Mustard	Do not apply beyond the 5 leaf stage, 70 day preharvest interval

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Apply at the 1 to 6 leaf stage of the following annual grassy weeds. Apply at the 2 to 3 leaf stage for optimum control. Optimum weed control and yield response occur when weeds are controlled before tillering.

Barnyard grass
Green foxtail
Persian darnel
Volunteer barley
Volunteer wheat
Wild oats

Cost (2002 suggested retail price):

$11.95/acre.

Rates:

Component 1 - 0.19 L/acre. Component 2 - 0.32 L/acre. One case treats 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 5 to 10 gallons/acre (23 to 45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° stainless steel flat fan nozzles tilted forward at a 45° angle.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

If daytime temperatures before or after application are very hot and dry with low humidity, reduced control may result. Do not apply to crop that is stressed (frost, heat, drought, water saturated soil, disease, etc.) as crop injury may result.

Tank Mixes:

Herbicides:

Canola:
Lontrel (0.23 L/acre).
Muster (8 to 12 g/acre) (Argentine varieties only)

Flax (including Solin):
MCPA ester or amine (up to 0.34 L/acre - 500 g/L formulations).
Buctril M (0.40 L/acre).

Under adverse conditions, tank mixes of Fusion and Buctril M or Fusion and MCPA may result in reduced grassy weed control.

Fertilizers: None registered.

Insecticides: None registered.

Note: An interval of 4 days prior to, or 4 days after application of Fusion is required before any other pesticide can be applied (unless registered in a Fusion tank mix).

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours may result in reduced control.

Grazing: Do not graze treated crops or cut for feed prior to crop maturity.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: Do not apply within 15 m of non-target areas, water or wetland areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Experimental studies have shown that the active ingredient in Component 2 may cause birth defects in laboratory animals. Women capable of bearing children should avoid contact with this product.

glyphosate

Herbicide Group – 9
(Refer to page 27)

Company, Formulation and Cost (2002 suggested retail prices):

Product Name	Company	Salt*	Glyphosate acid content	Formulation	Container size**	Cost
Credit	Nufarm	IPA	356 g/L	Solution	1, 2, 3	$7.20/L
Factor	IPCO	IPA	356 g/L	Solution	1	$7.99/L
Glyfos	Cheminova	IPA	360 g/L	Solution	1, 2, 5	$8.95/L
Maverick	Dow AgroSciences	IPA	356 g/L	Solution	1, 2	$7.99/L
Renegade	Monsanto	IPA	356 g/L	Solution	1, 2	$7.99/L
Roundup Dry	Monsanto	MA	68.5%	Soluble granule	7	$16.33/kg
Roundup Original	Monsanto	IPA	356 g/L	Solution	1, 2, 4	$8.99/L
Roundup Transorb	Monsanto	IPA	360 g/L	Solution	1, 2, 3, 4, 6	$9.79/L
Touchdown 600	Syngenta	TMS	413 g/L	Solution	1, 3, 5	$12.23/L
Touchdown iQ	Syngenta	DA	360 g/L	Solution	1, 3 bulk	Not available
Vantage	Dow AgroSciences	IPA	356 g/L	Solution	1, 2, 3	$8.95/L
Vantage Plus	Dow AgroSciences	IPA	360 g/L	Solution	1, 2, 3	$9.79/L
Victor	Bayer CropScience	IPA	356 g/L	Solution	1,2	$8.95/L

* Salt type: IPA = Isopropylamine, TMS = Trimethylsulfonium, MA = Monoammonium, DA = Diammonium

** Container sizes available: 1) 2 x 10 L 2) 115 L 3) 450 L 4) 750 L 5) 1000 L 6) 1200 L 7) 10.4 kg

Production of Touchdown 600 has been discontinued. Stocks still remain in distribution. Touchdown 600 may be removed in the future.

Some products may be more effective (not related to higher glyphosate content) under adverse conditions, but that benefit is reduced when applications are made under optimal conditions for activity (i.e. rapid weed growth). When selecting a glyphosate product, consult the product manufacturer or ask your retailer about differences in the level of post-sales support provided for different products.

Crops and Uses:

1. Annual weed control prior to crop emergence or in summerfallow.
2. Quackgrass control prior to seeding or after harvest.
3. Canada thistle control in summer-fallow, shelterbelts and post-harvest.
4. Dandelion control (other than preharvest).
5. Alfalfa control (other than preharvest).
6. Other perennial weeds control in summerfallow, shelterbelts and post-harvest.
7. Patch treatments of perennial weeds in cereals, corn, soybean and forages.
8. Preharvest perennial weed control.
9. For use in Roundup Ready (glyphosate tolerant) crops.
10. Tank Mixes.

1. Annual weed control prior to crop emergence or in summer-fallow:

Weeds, Rates and Staging:

PRODUCTS	RATE PER ACRE	SURFACTANT *	WEEDS CONTROLLED	WEED STAGE
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	0.30 L	0.14 L/ acre	**Grasses:** Green foxtail, volunteer cereals, wild oat (light infestations) **Broadleaves:** lady's- thumb, stinkweed, volunteer canola (NOT including Roundup Ready varieties), wild mustard	Less than 3 inches (8 cm) high. Apply at the 1 to 3 leaf stage of wild oat.
Roundup Dry	0.16 kg			
Touchdown 600	0.25 L			
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	0.40 L	0.14 L/ acre	Above weeds plus: **Grasses:** heavy infestations of wild oat **Broadleaves:** suppression of flixweed, kochia	1 to 3 leaves for wild oat. Weeds 3 to 6 inches (8 to 15 cm).
Roundup Dry	0.21 kg			
Touchdown 600	0.32 L			
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	0.51 to 0.77 L	Not required	Above weeds plus: **Grasses:** downy brome, Persian darnel, **Broadleaves:** Canada fleabane, cleavers**, common ragweed, flixweed,hemp-nettle, lamb's-quarters,narrow-leaved hawk's-beard, redroot pigweed, Russian thistle, volunteer flax, wild buckwheat	Canada fleabane, common ragweed- less than 3 inches(8 cm) high. Other weeds less than 6 inches (15 cm). Use high rate for narrow-leaved hawk's-beard 3 to 6 inches (8- 15 cm) or wild buckwheat at the 3-4 leaf stage.
Roundup Dry	0.27 to 0.40 kg			
Touchdown 600	0.40 to 0.60 L			
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	0.91	Not required	Above weeds plus: **Grasses:** annual blue grass, crabgrass, **Broadleaves:** annual sow-thistle, kochia, prickly lettuce,	Less than 6 inches (15 cm) high shepherd's- purse
Roundup Dry	0.48 kg			
Touchdown 600	0.74 L			
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	1.42 L	Not required	Above weeds	Greater than 6 inches (15 cm) high
Roundup Dry	0.74 kg			
Touchdown 600	1.19 L			

* Unless otherwise specified, use one of the following surfactants: Agral 90, Agsurf, Companion, Enhance, Frigate or LI 700.

** Registered for control with Glyphos, Roundup Original, Roundup Transorb, Vantage and Vantage Plus only.

2. Quackgrass control prior to seeding or after harvest:

PRODUCT	RATE PER ACRE	QUACK GRASS STAGE
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	1.0 L	Season long control of light to moderate infestation. Apply when quack grass is 8 inches 20 cm) tall and has 3 to 4 actively growing (leaves. Apply spring or fall.
Roundup Dry	0.53 kg	
Touchdown 600	0.80 L	
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	1.0 to 2.8 L	Apply when quack grass has 3-4 new leaves for long term control of heavy infestations. Use high rate for sod-bound quack grass (left undisturbed for at least 2 years).
Roundup Dry	0.53 to 1.5 kg	
Touchdown 600	0.80 to 2.24 L	

Do not apply fall treatments if a hard frost has occurred (-5°C) or if plants are drought stressed. Spread straw to allow regrowth and good spray coverage.

Cultivation prior to application will result in reduced control. Do not cultivate between harvest and treatment when using fall applications. If using spring applications on fields which have been fall-tilled, delay application until the quack grass has reached the 4-5 leave stage. (This will occur 1 to 4 weeks later on fall-tilled fields than in undisturbed fields).

Cultivation after application usually will improve control of quack grass. Wait a minimum of 3 days after application before cultivating. If growing conditions are poor (cold or dry), particularly in the fall, waiting longer than 5 days may improve control.

3. Dandelion control (other than preharvest):

Apply up to and including dandelion bloom for best results.

PRODUCT	Less than 6 inches (15 cm) diameter. Allow 3 or more days after treatment before tillage.	Greater than 6 inches (15 cm) diameter. Use higher rate when infestation is heavy.	Prior to seeding or after harvest. Use higher rate for weeds beyond 3 inches (8 cm) or for heavy infestation. Allow 7 or more days after treatment before tillage.
Credit, Factor, Maverick, Roundup Original, Roundup Transorb, Vantage, Vantage Plus, Victor	1.0 L/acre	1.5 – 2.0 L/acre	-
Roundup Dry	0.53 kg/acre	0.80-1.06 kg/acre	-
Touchdown iQ	-	-	1.82 - 2.83 L/acre
Touchdown 600	-	-	1.38-2.24 L/acre

4. Canada thistle control in summer-fallow, shelterbelts and post-harvest:

PRODUCT	RATE PER ACRE	WEED STAGING
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	1.9-2.8 L	Bud stage or beyond. Allow at least 5 days after application before tillage.
Roundup Dry	1-1.5 kg	
Touchdown XP	1.6-2.24	
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	1.0 L	Rosettes at least 6 inches (15 cm) in diameter, treated in late summer, following tillage in spring and early summer (up to August 1). Allow thistles to regrow for 5 weeks following last tillage. Wait a minimum of 10 days after application before tillage. Treatment after a mild frost is possible if leaves are green and pliable and plants are actively growing.
Roundup Dry	0.53 kg	
Touchdown 600	0.80	
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	1.9-2.8 L	Post-harvest stubble treatment. Allow 8-10 inches (20-25 cm) of new growth before application. must be Plants sprayed at least 2 weeks prior to killing frost. Straw should be removed or evenly spread to allow for proper regrowth and spray coverage.
Roundup Dry	1.0-1.5 kg	
Touchdown 600	1.60-2.24 L	

5. Alfalfa Control (other than preharvest):

PRODUCT	RATE PER ACRE	WEED STAGING
Credit, Factor, Maverick, Renegade, Roundup Original, Roundup Transorb, Vantage, Vantage Plus, Victor	1.5 - 2.0 L	Fall control of alfalfa in early bud to full bloom stage. Use high rate when alfalfa populations are high or when perennial grasses are present. Allow at least 5 days before tillage. See tank mix section for minimum tillage or spring applications. Apply with 5-30 gal/acre (23-135 L/acre) water.
Glyfos	2.8 to 4.8 L	
Roundup Dry	0.8 - 1.1 kg	
Touchdown 600	0.75 - 1.44 L	Prior [illegible] seeding or after harvest. Use higher rate for weeds beyond 3 inches (8 cm) in height or for heavy weed infestations. Wait 7 days after application for tillage. Apply in 5-30 gallons/acre (23-135 L/acre) water.
Touchdown iQ	0.91 - 1.82 L	

6. Other perennial weed control in summerfallow, shelterbelts and post-harvest:

(Refer to individual product labels for detailed application information.)

	RATES IN UNITS PER ACRE		
	Foxtail Barley Seedling to heading*	**Toadflax**	**Other Perennial weeds****
Credit, Factor, Maverick, Roundup Original, Roundup Transorb, Vantage, Vantage Plus	1.0-2.0 L	1.0 L (vegetative stage in summer fallow)	4.9 L
Renegade, Victor	0.4 L (suppression) 2.8 to 4.9 L (control)	1.0 L (vegetative stage in summer fallow)	4.9 L
Glyfos	0.4 L (suppression) 2.8 to 4.9 L (control)	2.8 to 4.9 L (early bud stage)	4.9 L
Roundup Dry	0.53-1.1 kg	0.53 kg (vegetative stage in summer fallow)	2.5 kg
Touchdown 600	0.30 L (suppression) 2.24 to 3.84 L (control)	2.24 to 3.84 L (early bud stage)	3.84 L
Touchdown iQ	0.4 L (suppression) 2.8 to 4.9 L (control)	2.8 to 4.9 L (early bud stage)	2.8 to 4.9 L

* Late fall applications may provide better control of established foxtail barley plants than spring applications.

** Perennial weeds such as absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

7. Patch treatments of perennial weeds in wheat, oat, barley, corn, soybean, forage legumes and forage grasses:

(refer to product label for detailed application instructions)

	RATES PER ACRE				
	Quack grass 8 in (20 cm) tall	**Canada thistle Bud or beyond**	**Milkweed Bud to bloom**	**Other perennial weeds***	**Spot treatment rates for hand held equipment**
Credit, Factor, Glyfos, Maverick, Renegade, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus, Victor	1.0-2.8 L	1.9-2.8 L	4.9 L	2.8-4.9 L	1-2 L per 100 L water**
Roundup Dry	0.53-1.5 kg	1.0-1.5 kg	2.5 kg	1.5-2.5 kg	0.5-1.0 kg per 100 L water**
Touchdown 600	0.80-2.24 L	1.6-2.34 L	3.84 L	2.34-3.84 L	Not registered

* Perennial weeds such as absinthe, blue grass spp., smooth brome grass, cattail, curled dock, field bindweed (bloom stage or beyond), hemp dogbane, hoary cress, poison ivy, purple loosestrife, perennial sow-thistle, and yellow nutsedge applied at the early heading to early bud stage.

** Use the low rate for quack grass and the high rate for all other perennials.

8. Preharvest perennial weed control:

Crops registered and rates (per acre):

Product	Barley, bean (dry), canola, field pea, Flax (including Solin) lentil, soybean wheat.	Oat	Forages
Credit, Factor, Maverick, Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus	1.0 L	1.0 L	1.0-2.0 L
Roundup Dry	0.53 kg	0.53 kg	0.53-1.06 kg
Touchdown 600	0.80 L	0.80 L	Not registered
Renegade	1.0 L	Not registered	1.0-2.0 L
Glyfos, Victor	1.0 L	Not registered	Not registered

Do not apply to any crops grown for seed. May be applied to barley grown for malt. Contact malt barley buyers prior to application to confirm acceptance of glyphosate-treated barley.

Weeds Controlled with preharvest applications:

Product	Quack grass 4-5 green leaves	Canada thistle and perennial sow-thistle at bud stage or beyond	Common milkweed at bud to bloom stage	Toadflax at bud to full bloom stage	Dandelion from rosette to full bloomstage
Credit, Factor, Maverick, Renegade, Roundup Original, Roundup Transorb, touchdown iQ, Vantage, Vantage Plus	X	X	X	X	X
Glyfos Touchdown 600 Victor	X	X	X		
Roundup Dry	X	X	X	X	X

Crop Staging for preharvest applications:

Apply to crops (except forage) when grain moisture is less than 30%. The following chart lists visual symptoms that can be used as guidelines to when 30% grain moisture has been reached.

CROP*	VISUAL SYMPTOMS
Wheat, Barley, Oat	Hard dough stage – a thumbnail impression remains on seed.
Canola	Pods are green to yellow and most seeds are yellow to brown.
Flax (including Solin)	Majority (75 to 80% of bolls) are brown.
Lentil	Lowermost pods (bottom 15%) are brown and rattle when shaken.
Pea	Majority (75 to 80%) of pods are brown.
Soybean	Stems are green to brown in colour and pod tissue is brown and dry in appearance (80 to 90% leaf drop).
Dry Bean	Stems are green to brown in colour and pods are mature (yellow to brown) and 80 to 90% of the original leaves have dropped.
Forage	3 to 7 days prior to the last cut before rotation or forage renovation. Do not apply to forage stands that are to be maintained.

*See the crops section for a guide to the products registered on each crop

9. For Use in Roundup Ready (glyphosate tolerant) Crops including:

Roundup Ready Canola: (Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus only)
Roundup Ready Field corn: (Roundup Original, Roundup Transorb, Vantage and Vantage Plus only)
Roundup Ready Soybean: (Roundup Original, Roundup Transorb, Touchdown iQ, Vantage, Vantage Plus only)

Roundup Ready Crop Stage:

Canola - cotyledon to 6 leaf stage. Temporary yellowing may occur if applied at the 4-6 leaf stage of the crop.
Corn - 1-8 leaf stage
Soybean - first trifoliate leaf through flowering.

Weeds Controlled, Staging and Rates in Roundup Ready Canola:

PRODUCT	RATE (L/ACRE)	WEEDS CONTROLLED
Roundup Original Roundup Transorb Touchdown iQ Vantage Vantage Plus	0.33-0.50	**Annual grasses:** barnyard grass***, green foxtail, volunteer cereals, wild oat **Annual broadleaves:** annual smartweed spp.**, chick-weed, corn spurry, cow cockle*, hemp-nettle, kochia, lamb's-quarters, night-flowering catchfly*, redroot pigweed, Russian thistle, shepherd's-purse*, stinkweed, volunteer canola (except Roundup Ready varieties), wild mustard, wild tomato.
	0.50	**Annual broadleaves:** cleavers, flixweed***, wild buckwheat, stork's-bill***, narrow-leaved hawk's-beard*** **Perennial weeds suppressed:** Canada thistle, dandelion, perennial sow-thistle, and season long quack grass control.
	2nd application at 0.5 L/acre	**Annual broadleaves:** round-leaved mallow*** **Season long control of following perennials:** Canada thistle, foxtail barley, and perennial sow-thistle.
Roundup Original Roundup Transorb	0.75	**Season long control of following perennials:** Canada thistle, foxtail barley, and perennial sow-thistle.

Weeds, Staging and Rates in Roundup Ready Corn and Roundup Ready Soybean:
Apply 1.0 L/acre to control:

PRODUCT	RATE (L/ACRE)	WEEDS CONTROLLED
Roundup Original Roundup Transorb Vantage Vantage Plus Touchdown iQ (soybean only)	1.0 (Apply when weeds are less than 10 inches or 25cm high to maximise weed control and crop yield).	**Grasses:** barnyard grass, crabgrass spp., foxtail (green, yellow, giant), quack grass, proso millet***. **Broadleaves:** Canada thistle***, cocklebur, common milkweed (suppression only)***, common ragweed, eastern-black flowering night-shade, lady's-thumb, lamb's-quarters, perennial sow-thistle***, pig-weed (smooth, redroot), smartweed spp., velvetleaf, wild mustard, wild buckwheat, yellow nutsedge.
	2nd application at 1.0 L/acre. Late flushes of the above weeds.	Late flushes of the above weeds
Roundup Original Roundup Transorb Touchdown iQ	one application of 2.0 L/acre or two applications of 1.0 L/acre each	Field Bindweed (Roundup only.), Milkweed, (Touchdown iQ - Perennial sow-thistle, Canada thistle and improved control of heavy infestations of weeds listed at 1.0 L/acre

* Low rates can be used only up to the 3 leaf stage of thecrop otherwise use high rate.
** Low rates can be used only when annual smartweed is in 4 - 6 leaf stage.
*** Registered for control with Roundup Transorb and Roundup Original only.
° Not registered for control in soybeans with Vantage or Vantage Plus.

Tank mixes in Roundup Ready Crops:

Canola:

Roundup Original, Roundup Transorb, Vantage, and Vantage Plus only at 0.5 L/acre plus Lontrel at 112 mL/acre.

Soybean:

Roundup Original and Roundup Transorb only with Assure II at 154 mL/acre for volunteer RR corn control.

Corn:

Roundup Original and Roundup Transorb only with Atrazine at 0.63 to 0.84 L/acre of 480 to 500 g/L formulations or 0.34 to 0.45 kg/acre of 90% dry formulations for residual control of annual broadleaf weeds.

10. Tank Mixes:

RATE PER ACRE	Preseeding or pre-emergent wheat, barley, rye: 2,4-D* (0.23** - 0.58 L◊)	Preseeding or pre-emergent cereals: Pardner (0.51 L)	Alfalfa control in spring / fall: 2,4-D* (0.50 to 1.0 L)	Chem fallow: 2,4-D* (0.5 L) or Banvel II (0.12 L◊) Pardner (0.51 L)	Canada thistle control in stubble or fallow: Banvel II (0.51 L◊◊)	Preseeding or pre-emergent cereals, corn** flax, & field pea** MCPA (0.2 - 0.4 L)	Preseeding or pre-emergent cereals, corn, flax, canaryseed & seedling forage grasses: Buctril M (0.2 - 0.4 L)
Renegade Roundup Original Roundup Transorb	0.50-0.8 L	0.3-0.4 L	1.0-2.0 L	0.3-0.4 L	0.69 L	0.50-0.8 L	0.50-0.8 L
Factor	0.50-0.8 L	0.3-0.4 L	1.0-2.0 L	0.3-0.4 L	0.69 L	Not registered	Not registered
Credit, Maverick, Vantage Vantage Plus	Not	0.3-0.4 L	1.0-2.0 L	0.3-0.4 L	0.69 L	Not registered	Not registered
Glyfos Touchdown iQ Victor	Not registered	0.3-0.4 L	Not registered	0.3-0.4 L	0.69 L	Not registered	Not registered
Roundup Dry	0.30-0.4 kg	0.16-0.21 kg	0.53 – 1.1 kg	0.16-0.21 kg	0.36 kg	Not registered	Not registered
Touchdown 600	Not registered	0.25-0.32 L	Not registered	0.25-0.32 L	0.61 L	Not registered	Not registered

◊ **Roundup Ready (RR) canola control:** Tank mixes of 2,4-D* at 0.23 to 0.34 L/acre, MCPA and Buctril M will control volunteer RR canola up to the 4 leaf stage and 2,4-D at 0.45 to 0.68 L/acre will give control up to the 6 leaf stage. Banvel II at 0.12 L/acre will not control RR canola.

◊◊ See recropping restrictions for Banvel II with fall applications.

* Rates based on 500 g/L formulations. All formulations are registered for tank mixes.

** Use MCPA amine formulations only. Maximum rate of 0.28 L/acre prior to field pea.

*** Forage grasses include brome grass, crested wheatgrass, intermediate wheat grass, slender wheatgrass, tall wheatgrass, Russian wild rye, Timothy, Orchard grass, creeping red fescue, meadow fescue, meadow foxtail, tall fescue, meadow bromegrass, streambank wheatgrass and reed canary grass.

Note: The above mixes are those listed on the glyphosate labels only. To check for other possible mixes see the blue fold out chart inside the back cover. General guidelines can be found on page 13.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

Application Information:

Water Volume:

Do not use 'hard' or dirty water or weed control may be reduced.

Using clean water at 5 to 10 gal/acre (23-45 L/acre) will provide acceptable weed control in most situations; use of the lower volume will improve control.

Refer to specific weed control situations or labels for more information on water volumes and adjuvants.

Pressure: 30 to 40 psi (200 to 275 kPa)

Nozzles: Flat fan

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Best results are achieved when temperatures are near 20°C and when weeds are actively growing. Frost which kills more than 40% of the above ground tissue will reduce control. Control will also be reduced if foliage is heavily covered with dust.

Restrictions:

Rainfall: Do not apply if rainfall is forecast for the time of application, as weed control may be reduced. Consult manufacturer for more information.

Grazing Interval: Do not graze or cut for hay, any crops treated with Touchdown 600. Only grain and forages treated with Touchdown iQ may be fed to livestock. All portions of forage and crops treated with other products may be fed to livestock.

Recropping Interval: No restrictions.

Aerial application: Do not apply by air. Consult manufacturer for current aerial preharvest registration status.

Storage: May be stored below 0°C.

Equipment: Do not mix, store or apply this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Environment: Maintain a 15 m buffer zone from non-target areas

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison - Touchdown 600

All other products - Skin and Eye Irritant

Gramoxone

Herbicide Group – 22

(Refer to page 27)

Company:

Syngenta

Formulation:

200 g/L paraquat. Container size - 5 L, 1 L.

Crops and Staging:

Stale seedbed - Non-selective weed control applied 3 days prior to crop emergence in beans, corn, potatoes, peas, soybeans.

Non-selective weed control applied as a directed spray between rows in row crops. Avoid contact with crop foliage.

Control of weed seedlings in established alfalfa and bird's-foot trefoil for hay - apply 5 days after first cut.

Control of weed seedlings in bird's-foot trefoil for seed - apply in spring when bird's-foot trefoil shoots are 3 to 6 inches (7.5 to 15 cm) long

Non-selective weed control applied as a directed spray in and around shelterbelt trees. Avoid contact with shelterbelt foliage.

Weeds and Staging:

Annual weed burn-off. Best control when weeds are less than 2 inches (5 cm) in height or diameter.

Cost (2002 suggested retail price):

$24.32 to $48.64/acre

Rates:

If weeds are less than 2 inches (5 cm) in height, apply 1.1 L/acre (one 5 L jug treats 4.5 acres). If weeds are taller than 2 inches (5 cm), increase the rate of Gramoxone to 2.2 L/acre (one 5 L jug treats 2.2 acres).

Application Information:

Water Volumes: 30 to 110 gallons/acre (135 to 500 L/acre). Use the higher water volumes within the range if weed growth is dense.

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Best results on cloudy days or just prior to darkness.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 1 hour will reduce weed control.

Grazing: Do not graze or harvest treated foliage. Regrowth from treated alfalfa or bird's-foot trefoil may be fed to livestock.

Recropping: None.

Aerial Application: No restrictions on label, however, since this product requires a minimum of 30 gallons/acre of water, applications by air are impractical.

Storage: Do not freeze.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Danger - Poison (may be fatal if swallowed)

Danger – Corrosive to eyes

Grazon

Herbicide Group – 4

(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

65 g/L picloram + 240 g/L 2,4-D formulated as an emulsifiable concentrate.

Container size – 10 L, 110 L.

Note: Available only through selected retail outlets.

Crops and Staging:

Permanent grass pasture and rangeland. Apply in spring or early summer.

Weeds, Rates and Staging:

Broadleaf weeds – Apply 2.8 L/acre:

Burdock
Canada thistle
Clovers (red, sweet)
Common ragweed
Dandelion
Dock
Fleabane
Goldenrod
Plantain
Prickly lettuce
Vetch

Woody plants - Apply 7.3 to 10.1 L/acre by ground and 10.1 to 14.2 L/acre by air:

Alder
Aspen$^{\Delta}$
Birch
Cedar (red cedar*)
Cherry$^{\Delta}$
Locust$^{\Delta}$
Maple*
Oak$^{*\Delta}$
Pine*
Poplar
Spruce
Sumac$^{\Delta}$
Willow$^{\Delta}$

$^{\Delta}$ Aerial application only

* High rate by air when species growing on heavy clay soils. Use an approved drift control additive or system.

Cost (2002 suggested retail price):

$14.00/L

Application Information:

Water volume:

Ground application: 80 L/acre (18 gallons/acre)
Aerial application: 60-80 L/acre (14-18 gallons/acre)

Pressure: Maximum 30 psi (207 kPa) while maintaining uniform pattern.

Nozzles: Flat fan. Use an approved drift control system that produces coarse droplets in a uniform pattern.

Drift of even small amounts of Grazon into sensitive plants or areas where sensitive crops may be grown can cause injury. Do not apply under conditions prone to drift (i.e. high winds and temperature inversions).

How it Works:

Refer to table 2 on page 29.

IMPORTANT: Picloram is a very persistent and water-soluble herbicide. Treated soil should not be moved from the treated area. Do not apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. Do not apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. When applying Grazon over sandy soils ensure that aquifers are not within 1.8 m of the soil surface. If shallow aquifers are present, do not apply Grazon. Grazon must not be applied on range and pasture acres that are irrigated. Do no compost or mulch clippings or manure from grass treated with Grazon unless being reapplied to the treated area.

Effects of Growing Conditions:

Nothing listed on label.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Do not apply if rainfall is forecast.

Grazing: Do not allow lactating dairy animals to graze treated areas within 7 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter. Do not harvest forage or cut hay within 30 days of application. See restrictions in "How it Works" section above.

Recropping: Legumes may not be established in a pasture for several years after treatment. If legumes are essential in a pasture, do not use Grazon. Do not break up treated pasture and plant to sensitive broadleaf crops for at least 5 years after application of Grazon.

Storage: Store product in original containers in a secure, dry, cool area. Do not freeze.

Environment: This product is moderately toxic to fish. Apply this product well back from any water bodies to avoid contamination. Heavy rains can move this product from its application site down slope toward sensitive areas. Do not load or mix near wells, dugouts or other water bodies. Contact the provincial environment department for permits to apply near water.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Harmony Total

Herbicide Group - 1, 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

Refine Extra: 50% thifensulfuron methyl, 25% tribenuron methyl; formulated as a water dispersible granule. Container size: 4 x 80 g water soluble pouches (320 g total).

Horizon: 240g/ L clodinafop-propargyl formulated as an emulsifiable concentrate. Container size: 1 x 3.68 L

Score adjuvant. Container size - 2 x 6.4 L

Crops and Staging:

Spring wheat (including durum) from the 2 leaf stage up to emergence of the flag leaf.

Weeds and Staging:

Grass Weeds:

Wild oat -1 to 6 leaves up to the emergence of the 4th tiller. Green foxtail -1 to 5 leaves up to the emergence of the 3rd tiller

Broadleaf Weeds:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

Controlled:

Ball mustard
Chickweed (1 to 6 leaf)
Common groundsel
Corn spurry
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Narrow-leaf hawk's beard
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola
 (CLEARFIELD canola only
 with MCPA Ester tank mix)
Volunteer sunflowers
Wild buckwheat (1 to 3 leaf)
Wild mustard

Suppressed:

Cleavers - 1 to 3 whorls
Stork's-bill, round-leaved mallow - 2 to 6 leaves
Canada thistle, perennial sow-thistle - under 6" (15 cm) tall, prior to budding
Scentless chamomile
Toadflax - less than 6" (15 cm) tall

For optimum control apply before the annual grasses tiller. Harmony Total will also control or suppress the broadleaf weeds listed for Refine Extra alone at 8 g/acre.

Cost (2002 suggested retail price):

$21.78/acre (2001 suggested retail price)

Rates:

Refine Extra - 8 g/acre
Horizon - 0.093 L (93 mL)/acre
Score - 0.8 L/100 L of spray solution
One case treats 40 acres (16 ha)

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kpa).

Nozzles: Flat fan nozzles with 50 mesh line strainers and screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply to crop stressed by conditions such as frost, low fertility, drought, flooding, disease or insect damage as crop injury may result.

Kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

Tank Mixes:

Do not tank mix with substances that contain boron or that release chlorine.

Herbicides:
MCPA Ester (0.38 to 0.45 L/acre of 500 g/L formulation).

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Rainfall within 30 minutes may reduce grass control. Rainfall within 4 hours may reduce broadleaf control.

Grazing: Do not graze or harvest treated crops for forage within 3 days of application.

Recropping: No restrictions the year after treatment.

Aerial application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Ammonia must be used to deactivate Harmony Total when cleaning.

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill the tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, and then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water (1 L of 3 percent ammonia per 100 L water). If the spray equipment is to be used to spray crops other than cereals, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

Eye and skin irritants.

Hoe-Grass 284

Herbicide Group – 1
(Refer to page 27)

Company:

Bayer CropScience

Formulation:

284 g/L diclofop-methyl formulated as an emulsifiable concentrate. Container size - 10 L.

Crops, Rates and Staging:

Unless specified, there are no leaf stage restrictions but do not apply within 60 days of harvest.

Apply 1.42 L/acre (7 acres per jug) to the following crops:

Dry beans
 (white, black, pinto)
Fababeans
Potatoes
Soybeans

Apply 1.01 to 1.13 L per acre (7.75 to 10 acres per jug) to the following crops:

Barley (1 to 4 leaves,
 before tillering)
Flax
Lentils
Mustard
Peas (field and processing)
Rapeseed (canola)
Rye (spring and fall)
Sunflowers (except Corona)
Tame buckwheat
Triticale
Wheat (spring, durum
 and winter)

Seedling Forage grasses:
bromegrass, creeping red fescue, crested wheatgrass, intermediate wheat-grass, Russian wild ryegrass)

Seedling legumes (forage or seed production):
alfalfa, red clover and sweet clover

Seedling legumes (seed production only):
Sainfoin and alsike clover

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Wild oats, green and yellow foxtail and barnyard grass - 1 to 5 leaf stage. Although registered for application up to the 5 leaf stage of wild oats, results at this stage are inconsistent and this use is not recommended. For best results, apply when the majority of weeds are in the 2 to 3 leaf stage. Persian darnel - 1 to 3 leaf stage.

Volunteer corn - 6 to 10 inches (15 to 25 cm) in height.

Cost (2002 suggested retail price):

$13.56 to $19.06/acre.

Application Information:

Water Volume:
Ground equipment: 10 gallons/acre (45 L/acre)
Aerial equipment: A minimum of 3 gallons/acre (14 L/acre).

Pressure:
Ground equipment: 40 psi (275 kPa).
Aerial equipment: 45 psi (300 kPa).

Nozzles:
Ground equipment: 80° or 110° stainless steel flat fan nozzles tilted forward at an angle of 45°.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Application under hot (above 28°C) or droughty conditions will result in reduced weed control. Hoe-Grass 284 provides optimum results under cool, moist conditions.

Under certain environmental conditions, yellow blotches may appear on barley leaves. Under certain environmental conditions, especially hot, humid weather, leaf scorch on cereals and leaf cupping and burn on broadleaf crops may result from Hoe-Grass 284 application.

Tank Mixes:

Herbicides:

CROP	HERBICIDE TANK MIX
Wheat (spring and durum), flax, barley. Use 1.13 L/acre of Hoe-Grass 284.	Pardner - 0.405 L/acre. Will not control wild mustard beyond the 3 leaf stage.
Canola. Use 1.13 L/acre of Hoe-Grass 284.	Lontrel - 0.17 L/acre.

Fertilizers: None registered.

Insecticides: Hoe-Grass 284 may be tank mixed with Decis 5EC on wheat (spring, winter and durum), barley, flax, rapeseed (canola), mustard and potatoes. See Decis 5EC label for recommended rates and cautions.

Do not tank mix Hoe-Grass 284 with any pesticide for aerial application. Do not tank mix Hoe-Grass 284 under stress conditions such as prolonged periods of drought, excessively hot temperatures or low humidity as reduced control of grassy weeds may result. Apply other pesticides, fertilizers or chemical additives at least 4 days after application of Hoe-Grass 284.

Note: The above mixes are those listed on the HoeGrass 284 label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour of application will reduce control.

Grazing: Do not graze or cut for feed treated cereal crops prior to crop maturity. Do not feed treated forages in the year of treatment. Do not feed sainfoin or alsike clover for the life of the stand.

Preharvest Interval: Do not harvest within 60 days of treatment.

Recropping: No restrictions the year after application.

Aerial Application: May be applied by aircraft for weed control in wheat, barley, flax or rapeseed (canola) only. Apply in a minimum 3 gallons/acre (15 L/acre) water volume. Do not tank mix with any other products.

Storage: Do not freeze. Shake well before using.

Environement: HoeGrass 284 is toxic to fish. Avoid drift or other contamination of water bodies, wetlands and other non-target areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Danger Corrosive

Hoe-Grass II

Herbicide Group – 1,6

(Refer to page 27)

Company:

Bayer CropScience

Formulation:

230 g/L diclofop methyl and 80 g/L bromoxynil formulated as an emulsifiable concentrate.

Container size - 10 L.

Crops and Staging:

Wheat, triticale and spring rye - no leaf stage restrictions, but do not apply within 60 days of harvest.

Barley - 1 to 4 leaf stage and before tillering.

Flax - 2 to 4 inches (5 to 10 cm) in height.

The following seedling forage grasses grown for seed in the 2 to 5 leaf stage:

bromegrass
creeping red fescue
crested wheatgrass
intermediate wheatgrass
Russian wild ryegrass

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Grasses:

Wild oats, green and yellow foxtail, barnyard grass at the 1 to 4 leaf stage

Persian darnel at the 1 to 3 leaf stage.

Volunteer corn at 6 to 10 inches (15 to 25 cm in height)

Broadleaves:

Apply up to the early 4 leaf stage unless otherwise indicated

- Common groundsel
- Cow cockle
- Green smartweed
- Kochia
- Knawel
- Lady's-thumb
- Lamb's-quarters
- Night-flowering catchfly
- Redroot pigweed
- Russian thistle (up to 2 in. (5 cm) tall
- Scentless chamomile
- Stinkweed
- Tartary buckwheat
- Wild buckwheat
- Wild mustard

Best results are obtained from early applications (2 to 3 leaf stage of grassy and broadleaf weeds).

Cost (2002 suggested retail price):

$19.39/acre.

Rates:

1.4 L/acre (one container treats 7 acres).

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° stainless steel flat fan nozzles tilted forward at an angle of 45°.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Applications of Hoe-Grass II during periods of crop stress, when plants are not actively growing because of hot temperatures (above 28°C) or under very dry conditions or low humidity, may result in substantially reduced weed control. Under certain environmental conditions yellow blotches may appear on crop leaves. During periods of stress (above 28°C) or high humidity, flax may show leaf burn, retarded growth and a slight delay in maturity. Avoid spraying flax under these conditions.

Tank Mixes:

Herbicides: Hoe-Grass II may be tank mixed with MCPA amine (500 g/L) at the reduced rate of 0.028 L/acre to improve wild mustard control in wheat (spring and durum), barley (except Norbert, Glenn, Betzes or Klages), spring rye and triticale. Exceeding the recommended rate of MCPA amine 500 will result in a severe reduction in grassy weed control. Although registered, this tank mix is not recommended because of inconsistent results and possible antagonism of grassy weed control.

Fertilizers: None registered.

Insecticides: Hoe-Grass II may be tank mixed with Decis 5EC on wheat (spring and durum), barley and flax.

Allow a 4 day interval between application of Hoe-Grass II and other herbicides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour will reduce control.

Grazing: Do not graze treated crops or cut for hay.

Preharvest Interval: Do not apply within 60 days of harvest.

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze. Shake well before using.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Horizon

Herbicide Group – 1
(Refer to page 27)

Company:

Syngenta

Formulation:

240 g/L clodinafop-propargyl formulated as an emulsifiable concentrate.

1 case contains 3.68 L of Horizon plus 2 x 6.4 L containers of Score adjuvant.

Crops and Staging:

Spring wheat (including durum) - up to the emergence of the 4th tiller.

When tank mixing, check broadleaf product for additional staging restrictions.

Weeds and Staging:

Wild oats - 1 to 6 leaf stage, maximum 3 tillers.

Green and yellow foxtail - 1 to 5 leaf stage, prior to emergence of 3rd tiller.

Barnyard grass - 1 to 5 leaf.

Volunteer canaryseed - 1 to 6 leaf.

Persian darnel - 1 to 5 leaf stage and before tillering.

Volunteer oats - 3 to 6 leaf.

Apply at the 2 to 3 leaf stage for optimum control.

Optimum weed control and yield response occurs when weeds are controlled before tillering.

Cost (2002 suggested retail price):

$17.14 to $20.75

Rates:

Wild oats, green and yellow foxtail, volunteer oats, barnyard grass, volunteer canaryseed: apply 0.095 L (95 mL)/acre (40 acres/case). Add Score adjuvant at a rate of 0.8 L per 100 L spray solution.

The above weeds plus Persian darnel: apply 0.115 L (115 mL)/acre (32 acres/case). Add Score adjuvant at a rate of 1 L per 100 L spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information;

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 to 45 psi (275 to 310 kPa).

Nozzles: 80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

For optimum results, apply to actively growing weeds. Do not apply to crops or weeds that are stressed by hot or cool conditions, frost, drought, low fertility, water-saturated soil, disease or insect damage as crop injury and poor weed control may result.

Tank Mixes:

Mixes provide control of wild oat, green foxtail, and weeds/insects controlled by the tank mix partner unless otherwise noted.

Herbicides:

In spring wheat (including durum except where indicated):

2,4-D amine at 0.34 to 0.45 L/acre
Ally at 3 g/acre
Attain at 40 acres/case (NOT in durum wheat)
Buctril M at 0.40 L/acre ***
Curtail M at 0.81 L/acre
Dichlorprop + 2,4-D at 0.71 L/acre**
DyVel at 0.50 L/acre
Lontrel at 0.17 to 0.34 L/acre
Lontrel at 0.11 to 0.17 L/acre + MCPA ester at 0.45 L/acre
Lontrel at 85 mL/acre + Refine Extra at 8 g/acre
MCPA amine or ester at 0.34 to 0.45 L/acre
MCPA Sodium Salt at 0.48 to 1.09 L/acre*
Mecoprop at 2.2 to 2.8 L/acre
Pardner at 0.40 L/acre
Prestige at 20 acres/case (NOT in durum wheat)
Refine Extra at 8 g/acre
Target at 0.4 to 0.6 L/acre**
Thumper at 0.40 L/acre
Unity at 40 acres/case

* Rate above 0.81 L/acre may cause crop injury.
** Barnyard grass also controlled
*** Barnyard grass and Persian darnel also controlled

Refer to the broadleaf herbicide label for crop staging, and other information. When tank mixing, always add the broadleaf herbicide first, followed by Horizon, with the Score adjuvant added last. Reductions in green foxtail and wild oat control may be observed when tank mixed with 2,4-D amine and MCPA amine.

Fertilizers: None registered.

Insecticides: Horizon can be tank mixed with:
Decis 5F at 32 to 48 mL/acre
Matador at 25 to 33 mL/acre.

Note: The above mixes are those listed on the Horizon label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13

Restrictions:

Rainfall: Rainfall within 30 minutes may reduce control.

Grazing: Do not graze or harvest treated crops for forage within 3 days of application.

Preharvest: Do not apply within 60 days of harvest.

Recropping: No restrictions.

Storage: May be frozen.

Aerial Application: Do not apply by air.

Environment: Do not apply within 15 m of rivers, lakes, ponds, wetlands, sloughs, irrigation water, vegetated ditch banks, or water used for livestock or domestic purposes.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Warning Eye and Skin Irritant

Horizon BTM

Herbicide Group – 1, 6

(Refer to page 27)

Company:

Syngenta

Formulation:

Horizon 240 EC (240g/L clodinafop - propargyl formulated as an emulsifiable concentrate). Container size - 1.84 L

Buctril M (280g/L bromoxynil and 280g/L MCPA ester) formulated as an emulsifiable concentrate. Container size - 8 L

Horizon BTM adjuvant. Container size: 6.4 L
Each case treats 20 acres. .

Crops and Staging:

Spring wheat (including durum) from the 2 leaf stage up to the emergence of 4th tiller.

Weeds and Staging:

Grass Weeds:

Wild oat 1 to 6 leaves up to the emergence of the 4th tiller
Green foxtail 1 to 5 leaves up to the emergence of the 3rd tiller.

Broadleaf Weeds:

Weeds controlled up to 4 leaf stage:

American nightshade
Bluebur
Ball mustard
Cocklebur
Cow cockle
Flixweed
Green smartweed
Kochia**
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed*
Russian thistle**
Scentless chamomile***
Shepherd's-purse
Volunteer canola
Volunteer sunflower

* May not be controlled in flax.
** Control before plants are 2 inches tall.
*** Spring seedlings only.

Weed controlled up to 6 leaf stage:
Wild tomato

Weeds controlled up to 8 leaf stage:
Common groundsel
Common ragweed
Lamb's-quarters
Stinkweed
Tame buckwheat
Tartary buckwheat
Wild buckwheat
Wild mustard
Wormseed mustard

Weeds with top growth controlled:
Canada thistle
Perennial sow-thistle

Cost (2002 suggested retail price):

$22.50/acre

Rates:

0.405 L/acre Buctril M
0.092 L/acre Horizon
0.32 L/acre Horizon BTM adjuvant
One case treats 20 acres.

Add Buctril M first, followed by Horizon 240 EC with the Horizon BTM adjuvant added last.

Application Information:

Water Volume: At least 40 L/acre (9 gallons/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° flat fan stainless steel nozzles tilted forward at an angle of 45°.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

For optimum results, apply to actively growing weeds and in humid conditions. Do not apply to crops or weeds that are stressed due to drought, frost, water logging, infertile conditions or disease or insect damage.

Tank Mixes:

Herbicides:
Refer to individual labels for registered tank mixes.

Insecticides: None registered.

Fungicides: None registered.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Grazing: Do not graze treated crops or cut for feed within 30 days of application.

Recropping: No restrictions the year after treatment.

Aerial application: Do not apply by air.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison.

Skin and Eye Irritant.

K2

Herbicide Group – 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

Refine Extra: 50 percent thifensulfuron methyl plus 25 percent tribenuron methyl formulated as a dry flowable. Container size: 4 water-soluble bags (80 g each, total 320 g).

Everest: 70 percent flucarbazone-sodium formulated as a water dispersible granule. Container size: 4 x 174g water-soluble packets.

Crops and Staging:

Spring wheat (NOT including durum) - Apply from 1 (expanded) to 4 main stem leaves up to two tillers. Injury may result if applied outside the recommended stages.

Caution: K2 MUST be applied with 2,4-D Amine (not supplied) at 0.35 L to 0.45 L/acre (based on 500g/L formulation) plus 0.25% v/v of a recommended surfactant. See 2,4-D for additional staging and application restrictions.

Weeds and Staging:

Grasses:

Wild oats and green foxtail at the 1 to 6 leaf stage (4 leaves on the main stem plus 2 tillers)

Broadleaves:

Unless otherwise indicated, apply to young, actively growing broadleaf weeds that are up to 4 inches (10 cm) tall or wide.

Weeds Controlled (when tank mixed with 2,4-D):

Burdocks (seedlings)
Chickweed
Cocklebur
Common ragweed
Common plantain
Common groundsel
Corn spurry
Cow cockle
False ragweed
Flixweed
Giant ragweed
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Mustard (ball, hare's ear, Indian, tumble, wild, wormseed)
Narrow-leaf hawk's-beard
Pigweed (redroot, Russian)
Prickly lettuce
Russian thistle
Shepherd's-purse
Stinkweed
Sweet clover
Tartary buckwheat
Volunteer canola
Volunteer sunflower
Wild Buckwheat
Wild radish

Weeds Suppressed:

Canada thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Cleavers (1 to 3 whorls)
Round-leaf mallow (2 to 6 leaf)
Scentless chamomile
Sow Thistle
Stork's-bill (2-6 leaf)
Toadflax (less than 15cm tall)

Cost (2002 suggested retail price):

$20.24/acre plus cost of 2,4-D Amine and adjuvant.

Rates:

Refine Extra: 8g/acre

Everest: 17.4 g/acre (One case treats 40 acres)

2,4-D Amine (not supplied) must be mixed with K2 at 0.34 to 0.45 L/acre (based on 500g/ L formulation) for crop tolerance.

Agral 90 or Ag-Surf at.0.25 L per 100L of spray solution

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13 of the 2001 Guide to Crop Protection.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 50 psi (200 to 345 kPa).

Nozzles: Flat Fan nozzles at 80° or 110°. Use of flood-jet or controlled droplet application equipment is not recommended.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop tolerance and weed control may be reduced if applications are made to plants growing under stress. Stress includes saturated or waterlogged soil, drought, extreme high or low temperatures, large fluctuations in daily temperature, low fertility or visible disease symptoms at application.

Kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

Tank Mixes:

Herbicides: K2 – MUST be applied with 2,4-D amine and a recommended surfactant.

Fertilizers: None registered. Do not mix soluble bags with liquid fertilizers.

Insecticides: None registered.

Restrictions:

Rainfall: Rainfall within 4 hours of application may reduce degree of weed control.

Grazing: Do not graze treated fields. Mature grain or straw may be fed to livestock.

Pre-harvest interval: 80 days

Re-cropping interval: The following crops may be planted 11 months after application: *Black, Dark Brown and Grey-Wooded Soil Zones:* spring wheat, barley, canola, and field peas. *Brown Soil Zone:* spring wheat.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen but the water-soluble bags may become brittle and break if handled roughly.

Tank Cleaning:

Both components of K2 can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray K2 should be flushed out immediately before using another product. Follow the steps below:

1. Drain the tank and thoroughly rinse the spray tank, boom and hoses with clean water. Pay particular attention to flushing out any visible deposits.
2. Fill the tank with clean water and 1% v/v (1 L/100L) household ammonia. Flush the hoses, boom and nozzles with the solution. Circulate for at least 15 minutes. Flush hoses, boom and nozzles once more, then drain the tank.

3. All nozzles, screens and filters should be removed and cleaned after applying this product. Clean nozzles and screens in a separate container using the ammonia and water.
4. Repeat #2.
5. Rinse tank, boom and hoses with clean water.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

Warning - Eye and Skin Irritant

Kerb 50-W

Herbicide Group – 15
(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

50 percent propyzamide formulated as a wettable powder.
Container size - 1.36 kg (3 x 454 g).

Crops and Staging:

Apply to the following established crops between October 1 and freeze-up or very early spring*:

Seedling and established alfalfa, bird's-foot trefoil, and established pastures**.

* Seed alfalfa only.

** Severe stand thinning may occur to pastures consisting primarily of crested wheatgrass, meadow fescue and timothy. Some thinning (10 to 15%) may occur with tall fescue and creeping red fescue.

Weeds, Rates and Staging:

Apply in late fall or very early spring (seed alfalfa only) prior to the emergence of weeds.

Established grass or grass/legume pastures for control of foxtail barley:
Brown, dark brown or gray wooded soils - 0.36 kg/acre.
Black soils - 0.45 kg/acre.

Alfalfa and bird's foot trefoil:
Annual grasses, volunteer cereals, wild oat - 0.71 kg/acre.
Quackgrass, orchardgrass, timothy, chickweed - 0.91 to 1.32 kg/acre*.
Dodder control (fall application only) - 1.32 kg/acre. Note that complete control may not be achieved.

* Maximum 0.91 kg per acre with spring application. Low temperatures and adequate moisture following application are needed for efficacy.

Caution: Do not use on soils with more than 6 percent organic matter. Do not apply to soils prone to flooding.

Cost (2002 suggested retail price):

$67.49/kg.

Application Information:

Water Volume: 27 to 45 gallons/acre (120 to 200 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Dry soil conditions at time of weed emergence may result in reduced control. Approximately 3 inches of total precipitation is required for adequate activation. Best results when soil temperatures are low but above freezing.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Surface applications are most effective if followed by 0.5 to 1 inch (1.25 to 2.5 cm) of rain within 2 days of application.

Grazing: Do not graze or harvest for livestock feed within 90 days of the 1.32 kg/acre rate and 60 days of application for lower rates.

Recropping: Do not replant to crops within 1 year of treatment.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place.

Environment: Do not contaminate domestic or natural water sources or wetlands.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Laddok

Herbicide Groups – 5,6

(Refer to page 27)

Company:

BASF Canada

Formulation:

200 g/L bentazon and 200 g/L atrazine formulated as a solution.
Container size - 10 L.

Crops and Staging:

Corn (grain, silage and seed) at the 1 to 5 leaf stage. Seed corn producers should consult the seed corn company regarding the tolerance of seed production lines to Laddok and oil concentrates.

Weeds, Staging and Rates:

Add Assist at 1.0 L per 100 L of spray solution.

ANNUAL WEEDS	1.21 L/ACRE		1.62 L/ACRE	
	inches	(cm)	inches	(cm)
Black nightshade			0.2 - 0.8	(0.5 - 2.0)
Buttercup			2 - 4	(5 - 10)
Cocklebur	3 - 7	(7.5 - 17.5)	7 - 12	(17.5 - 30.0)
Common chickweed			Apply 1 to 3 weeks after emergence	
Common groundsel			2 - 4	(5 - 10)
Common ragweed	1 - 1.5	(2.5 - 4.0)	1.5 - 3	(4.0 - 7.5)
Corn spurry			1 - 4	(2.5 - 10.0)
Giant ragweed			2 - 6	(5 - 15)
Hairy galinsoga			2 - 3	(5.0 - 7.5)
Lady's-thumb (smartweed)	1 - 3	(2.5 - 7.5)	3 - 8	(7.5 - 20.0)
Lamb's-quarters	1 - 2	(2.5 - 5.0)	2 - 4	(5 - 10)
Purslane			1 - 2	(2.5 - 5.0)
Redroot pigweed	0.7 - 1.2	(1.5 - 3.0)	1.2 - 1.5	(3 - 4)
Russian thistle			1 - 3	(2.5 - 7.5)
Venice mallow	1 - 2	(2.5 - 5.0)	2 - 4	(5 - 10)
Wild mustard	1 - 5	(2.5 - 12.5)	5 - 10	(12.5 - 25.0)
PERENNIAL WEEDS Yellow nutsedge	Rate: 1.21 - 1.62 L/acre 4 - 6	(10 - 15)	(repeat 7 - 10 days if necessary)	

Cost (2002 suggested retail price):

$15.43 to $20.66/acre.

Application Information:

Water Volume: 20 to 40 gallons/acre (90 to 180 L/acre). The higher recommended water volumes and pressures should be used for dense weed infestations or for weeds approaching the upper limit of their recommended stage for treatment.

Pressure: 40 to 45 psi (275 to 300 kPa).

Nozzles: Flat fan nozzles capable of delivering high water volumes.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop injury may occur if applications are made when crop is under stress because of prolonged cold weather, poor fertility or other factors; or when corn is wet and succulent from recent rainfall.

Best weed control is under warm, humid conditions.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 6 - 8 hours of application will reduce control.

Grazing: Do not graze the treated crop or cut for hay prior to crop maturity.

Recropping: No restrictions the year following treatment when label rates for annual weeds have been used. Use of the double application for yellow nutsedge control may cause injury to rotational crops because of carryover of the Atrazine component of the product. Under particularly dry soil conditions, there may be greater carryover of the atrazine component of Laddok that could damage a number of different special crops. Refer to the "Atrazine" product description for information.

Aerial Application: No restrictions on label. No information on effectiveness or crop injury concerns when applied by air.

Storage: Do not freeze.

Environment: Avoid conditions that will risk drift to non-target plant, water sources or wetlands.

Tank Cleaning:

The manufacturer does not provide information on tank cleaning.

Refer to Basagran and Atrazine recommendations and page 14.

Hazard Rating:

Caution Poison

Laser DF

Herbicide Groups – 1, 4, 2

(Refer to page 27)

Company:

Bayer CropScience

Formulation:

The Laser DF package contains 2 containers:

Greenfox: 28 g/L fenoxaprop-p-ethyl and 336 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 10.1 L.

DF: 75 percent thifensulfuron methyl formulated as a dry flowable. Container size - 162 grams.

Crops and Staging:

Spring wheat (not durum) - 2 to 6 leaf with a maximum of 3 tillers. Laser DF + 2,4-D ester may be used on Manitoba recommended varieties of durum wheat (Medora, Plenty, Sceptre and Kyle).

Durum wheat - 2 to 5 leaf with a maximum of 2 tillers. Do not use Laser DF on durum unless it is tank mixed with 2,4-D ester. If 2,4-D is not added, severe crop injury may result.

Application to spring or durum wheat beyond these stages may result in crop damage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Grass weeds:

Green foxtail – 1 to 6 total leaves including tillers. Apply at the 2 to 3 leaf stage for optimum control.

Broadleaf weeds:

Apply at the 2-4 leaf stage unless otherwise indicated:

Annual sunflower
Burdock
Chickweed (1 to 6 leaf)
Cocklebur
Field horsetail**
Flixweed*
Hoary cress
Kochia
Mustards (except dog, green tansy and wild)
Plantain
Prickly lettuce
Ragweed
Russian pigweed
Shepherd's purse*
Vetch
Wild Buckwheat (1 to 3 leaf)
Wild radish

Apply from cotyledon to 4 inches (10cm) across:

Canada thistle***
Corn spurry
Cow cockle
Green smartweed
Hemp-nettle
Lamb's-quarters
Redroot pigweed
Russian thistle
Stinkweed*
Volunteer canola
Wild mustard

* Spring seedlings only.
** Top growth control only.
*** Suppression only.

Cost (2002 suggested retail price):

$9.18/acre.

Rate:

Apply Greenfox at 0.51 L/acre and DF at 8 g/acre. One jug of Greenfox (10.1 L) and one container of DF (162 g) treats 20 acres.

When applying Laser DF to durum wheat, apply with 0.07 L/acre of 2,4-D LV600 (1.4 L treats 20 acres), or with 0.06 L/acre of 2,4-D LV700 (1.2 L treats 20 acres).

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume:

Spring wheat: 5 - 10 gallons/acre (23-45 L/acre).
Durum wheat: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° flat fan nozzles tilted forward at a 45° angle. Screens and filters 50 mesh or coarser.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply to crop that is stressed by heat, frost, low fertility, drought, water-saturated soil, disease or insect damage as crop injury and/or poor weed control may result. Poor weed control will result if weeds are too large, if coverage is poor or if weeds are not actively growing.

Tank Mixes:

Herbicides:

In Durum wheat:
2,4-D LV ester
In Spring wheat (not including durum):
Lontrel at 0.085 L/acre for season long control of Canada thistle up to 6 inches (15 cm) in height.

Fertilizers: None registered.

Insecticides: None registered.

An interval of 7 days prior to application, or 4 days after application of Laser DF, is required before any other pesticide can be applied.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours of application will reduce control.

Grazing: Do not graze or cut treated crops for forage prior to crop maturity.

Preharvest Interval: Do not apply within 70 days of harvest

Recropping: No restrictions the year after application.

Aerial Application: Do not apply by air.

Storage: Do not freeze. If stored for 1 year or longer, shake well before using.

Environment: Do not apply within 15 m of a body of water or wetland area.

Tank Cleaning:

The "DF" (thifensulfuron) component of Laser DF can cause severe injury to sensitive crops at very low concentrations. Sprayers used to apply Laser DF should be flushed out immediately after Laser DF is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L water) prior to using the sprayer on sensitive crops. All nozzles, screens and filters should be removed and cleaned after applying this product. Refer to product label for detailed cleaning instructions.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

For additional information, refer to page 14.

Hazard Rating:

☠ Danger Poison

Liberty

Herbicide Group – 10
(Refer to page 27)

Company:

Bayer CropScience

Formulation:

150 g/L glufosinate ammonium formulated as a solution.

Container sizes - 13.5 L, 108 L.

Crops and Staging:

Liberty Link Canola - cotyledon to bolting stage. Temporary crop discolouration (bronzing) may be observed after application.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

For Desiccation use:
Alfalfa - 50 to 75% pod turn (brown)
Lentils* - 40 to 60% pod turn (yellow to brown)
Potatoes* - 14 to 21 days prior to harvest.
*Not for crops grown for seed production.

Weeds, Rates and Staging:

WEED	WEED STAGE (from emergence to stage)	RATE (L/ACRE)	ACRES PER 13.5 L
Cow Cockle	4 leaf	0.54	25
Green foxtail	6 leaf (max. 3 tillers)		
Barnyard grass, volunteer canola	4 leaf	0.81	16.6
Wild mustard	5 leaf		
Lamb's-quarters, smartweed (lady's-thumb)	6 leaf		
Stinkweed	8 leaf		
Volunteer flax	2.5 inches (6 cm)		
Russian thistle	3 inches (8 cm)		

WEED	WEED STAGE (from emergence to stage)	RATE (L/ACRE)	ACRES PER 13.5 L
Wild buckwheat	3 leaf	1.1	12.4
Redroot pigweed, round leaved mallow, quackgrass*	4 leaf		
Light to moderate infestations of volunteer wheat, volunteer barley*	4 leaf (max. 2 tillers)		
Hemp-nettle (1 to 3 leaf pairs), shepherd's purse	6 leaf		
Common chickweed (max. 4 leaf pairs), Perennial sow-thistle	8 leaf		
Kochia	3 inches (8 cm)		
Canada thistle*, scentless chamomile	4 inches (10 cm)		
Cleavers	2 whorls (nodes)	1.35	10
Stork's-bill and heavy populations of wild buckwheat	3 leaf		
Quackgrass (light to moderate** or heavy infestations*)[1], volunteer wheat, volunteer barley*, wild oat	4 leaf (max. 2 tillers except quackgrass)		
Hemp-nettle	8 leaf (1 to 4 leaf pairs)		
Dandelion rosettes	6 in. (15 cm) across		
Flixweed, Canada thistle*	4 inches (10 cm)		
Quackgrass***	4 leaf	1.6	8.3
Canada thistle**	4 inches (10 cm)		

* Temporary top growth control. Plants may return from surviving growing points.
** Extended Top growth control.
***Season long control
[1] The company does not provide guidelines for weed densities. When in doubt as to the infestation level, use the high rate or contact the manufacturer

A second application can be made to fields that were treated initially with up to 1.35 L/acre. Apply Liberty at a rate of 0.81 to 1.35 L/acre in the second application.

Desiccation Rates:

Alfalfa - 1.09 L/acre
Lentil* - 0.81 to 1.09 L/acre
Potato* - 1.21 L/acre
* Not for crops grown for seed production.

Cost (2002 suggested retail price):

$13.70/L

Application Information:

Water Volume:
Ground applications: 10 gallons/acre (45 L/acre).
Aerial applications:
In Liberty Link canola use 5 gallons/acre (22 L/acre).
For desiccation, use 3 gallons/acre (13 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles:
Ground Application: 80° or 110° stainless steel flat fan nozzles tilted forward at an angle of 45°.
Aerial applications: Do not use raindrop nozzles. Use a combination of nozzles and pressure to provide a coarse droplet size distribution (mean diameter of 350 microns).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Liberty activity is influenced by environmental conditions. Cool temperatures (less than 10°C), drought, and low humidity conditions slow weed growth. Applications made under these stressed conditions may result in reduced weed control.

Tank Mixes:

Herbicides:

In Liberty Link canola:

Liberty may be tank mixed at 1.1 -1.35 L/acre with Select at 25.5 mL/acre for enhanced control of wild oat and volunteer barley. Consult Liberty label for exact weed control options. Add Amigo to the tank first at 0.5 L per 100 L spray solution followed by Liberty and then Select. Consult label for specific mixing instructions.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Liberty label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 hours may reduce control.

Grazing: Do not graze the treated crop or cut for feed.

Preharvest Interval: Do not harvest desiccated potato or lentil crops within 9 days of treatment.

Recropping: No restrictions.

Aerial Application: May be applied by air.

Storage: Do not freeze.

Environment: Do not apply within 15 m of environmentally sensitive areas using ground equipment or within 30 m of environmentally sensitive areas when applying by air.

Tank Cleaning:

Refer to tank cleaning section on page 14.

Hazard Rating:

◈ Warning Poison

Skin and Eye Irritant

Linuron

Herbicide Group – 7

(Refer to page 27)

Company/Products:

Bayer CropScience (Afolan F)
DuPont Canada Inc. (Lorox Toss-N-Go)
United Agri Products (Linuron 480)

The following recommendations are a blend of recommendations of all Linuron products. Consult the individual product labels for specific recommendations.

Formulations:

Afolan F/Linuron 480 - 480 g/L linuron formulated as a flowable. Container size - 10 L.

Lorox Toss-N-Go - 50 percent linuron formulated as a dry flowable. Container size - 10 kg.

Crops, Rates and Stages:

Post-emergent applications only:

CROP	STAGE	AFOLAN F (L/acre)	LINURON 480 (L/acre)	LOROX (kg/acre)
Spring wheat (including durum), oats and barley*	2 to 4 leaf stage	0.19 - 0.24	0.17 - 0.22	0.17 - 0.22
Field corn (post-emergent** directed spray)	Apply when corn is at least 15 inches (38 cm) high (highest leaf on free standing plant)	1.01 - 1.90	0.97 - 1.82	0.93 - 1.74
Shelterbelts (caragana, green ash, Siberian and American elm, Manitoba maple, poplar, willow, white spruce, Colorado spruce, Scots pine)	Apply as an overall spray to dormant stock or as a directed spray if buds have broken.	1.9 - 3.8	1.8	1.7

* Only when tank mixed with MCPA amine at 0.45 L/acre

**Use lower rate when weeds do not exceed 2 inches (5 cm) and higher rate for weeds up to 8 inches (20 cm) in height, preferably before they are 5 inches (13 cm) high.

For caraway and coriander, apply 0.51 to 0.67 L/acre of Afolan F (do not apply with MCPA) at the 2 to 4 leaf stage of the spice for control of wild mustard only.

Pre-emergent surface applications for use on loam to clay soils only:

PRODUCT	AFOLAN F (L/acre)		LINURON 480 (L/acre)		LOROX (kg/acre)	
Soil organic matter	less than 3%	from 3 - 5%	less than 2%	from 2 - 5%	less than 2%	from 2 - 5%
Field corn	1.01 - 1.52	1.52 - 1.90	0.91*	1.31*	0.30**	0.61**
Soybeans	1.01 - 1.52	1.52 - 1.9	0.91 - 1.31	1.31 - 1.82	0.91 - 1.31	1.31 - 1.82
Sweet white lupins	N/A	N/A	0.85	1.25	0.81	1.21
Potatoes	1.01 - 1.52	1.52 - 1.9	0.91	1.82	0.89	1.74

* Must be tank mixed with Atrazine 80W. Refer to label for tank mixes with Dual II and/or Primextra.

** Must be tank mixed with Dual II Magnum + Atrazine or Primextra.

If used on sandy soils, severe crop injury may result.

Seed the crop at least 2 inches (5 cm) deep.

Make only one application per year to field crops.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Post-Emergence:

When tank mixed with MCPA amine in cereals, the following weeds are controlled:

Ball mustard
Chickweed
Cocklebur
Common burdock
Common ragweed
Cow cockle
Field horsetail
  (suppression only)
Giant ragweed
Goat's-beard
Green foxtail
  (suppression only)
Green smartweed
Hare's ear mustard
Hemp-nettle
Indian mustard
Kochia
Lady's-thumb
Lamb's-quarters
Prickly lettuce
Prostrate pigweed
Redroot pigweed
Russian pigweed
Shepherd's-purse
Stinkweed
Stork's-bill
Tartary buckwheat
Tumble mustard
Wild buckwheat
Wild mustard
Wild radish
Wormseed mustard

Pre-emergent surface treatments:

Annual sow-thistle
Barnyard grass*
Common chickweed
Common ragweed
Crabgrass
Goosefoot
Green and yellow foxtail
Knotweed
Lamb's quarters
Purslane
Redroot pigweed
Shepherd's-purse
Smartweed
Stinkweed
Wheat
Wild buckwitchgrass
Wormseed mustard

*partial control

Afolan F is registered for wild mustard control only when applied alone in caraway and coriander.

Pre-emergent surface treatments:

Sufficient moisture (1 to 2 inches or 3 to 5 cm) in the form of rainfall or irrigation is necessary within 7 to 10 days of application or poor weed control will result.

Annual sow-thistle
Barnyard grass*
Common chickweed
Common ragweed
Crabgrass
Foxtail (green and yellow)
Goosefoot
Knotweed
Lamb's-quarters
Purslane
Redroot pigweed
Shepherd's-purse
Smartweed
Stinkweed
Wild buckwheat
Witchgrass
Wormseed mustard

*partial control

Costs (2002 suggested retail prices):

Afolan - $27.50/L
Lorox - $32.41/kg
Linuron 480 - $22.00/L

Application Information:

Water Volume:

Post-emergent: (Cereals) - 10 gallons/acre (45 L/acre).

Pre-emergent surface: 20 to 30 gallons/acre (90 to 135 L/acre)

Shelterbelts - 20 to 40 gallons/acre (90 to 180 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Stainless steel, flat fan nozzles with 50-mesh (or coarser) line strainers and screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

In post-emergent applications the best weed control occurs when temperatures are moderate, when relative humidity is high and when soil moisture is adequate. Injury to cereals (crop lightening) will occur when the crop is under stress because of drought or disease. This injury is worse when the product is applied at advanced leaf stages. In pre-emergent surface treatments, rainfall or irrigation (1 to 2 inches or 3 to 5 cm) is required to move linuron into the root zone of germinating seeds. Insufficient moisture will result in poor weed control. Drought conditions after application will result in little to no weed control. If rainfall does not occur within 7 to 10 days of application and prior to crop emergence, a shallow rotary hoeing (0.75 to 1.5 inches/ 2 to 4 cm) should be made to mix the top layer of soil to help activation. Avoid covering treated ground with untreated soil. If unusually heavy rain follows application, severe crop injury may result from herbicide in the root zone of the crop. Do not use on sandy soils or severe crop injury will result.

Tank Mixes:

Herbicides: For post-emergent applications in cereals, linuron must be tank mixed with MCPA amine. Do not tank mix with other herbicides. Do not tank mix Afolan F when applied to coriander and caraway.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the linuron labels only. For addition mixes see the blue chart inside the back cover. Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Pre-emergent applications require rainfall for activation. Contact manufacturer for more information.

Grazing: Do not graze treated crops or cut for feed prior to crop maturity.

Recropping: If the intended crop fails, fields treated with Pre-emergent surface applications of linuron, may be seeded back to corn, soybeans, sweet white lupins, or potatoes. Till the soil thoroughly before reseeding. No restrictions 1 year after treatment.

Aerial Application: No labelled restrictions. No information available on effectiveness or crop injury concerns when applied by air.

Storage: Do not store Afolan F at temperatures below 5°C. Lorox DF may be frozen.

Tank Cleaning:

Refer to page 14.

Lontrel

Herbicide Group – 4

(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

360 g/L clopyralid formulated as a solution.

Container size - 4.45 L.

Crops, Rates and Staging:

Applications of 0.17 - 0.23 L per acre (26.2 – 13.1 acres per jug):

Barley, wheat (spring and durum), oats - 3 to flag leaf stage.

Applications of 0.23 - 0.34 L per acre (19.3 - 19.3 acres per jug):

Flax (not including Solin- low linolenic varieties) - 2 to 4 inches (5 to 10 cm) in height.

Applications of 0.17 - 0.34 L per acre (26.2 – 13.1 acres per jug):

Canola - 2 to 6 leaf stage.

Seedling forage grasses - 2 to 4 leaf stage.

Established grasses - at the shot blade stage, or in the fall after harvest or in early spring.

Seedling and established grasses for forage and seed production include:

Altai wild ryegrass
Creeping red fescue
Crested wheatgrass
Intermediate wheatgrass
Kentucky bluegrass
Meadow fescue
Meadow foxtail
Orchardgrass
Reed canarygrass
Slender wheatgrass
Smooth bromegrass
Streambank wheatgrass
Tall fescue
Tall wheatgrass
  (for forage only)
Timothy
Russian wild ryegrass

Applications of 0.34 L per acre (13.1 acres per jug):

Summerfallow – Stage according to weeds.

Shelterbelts containing villosa lilac, acute willow, Colorado spruce, white spruce, buffaloberry and chokecherry.*

- * Since this use is registered under minor use application, the manufacturer assumes no responsibility for herbicide performance.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

The following weeds will be controlled when young and actively growing:

Alsike clover
Common groundsel
Perennial sow-thistle
  (top growth only)
Scentless chamomile
Wild buckwheat
Volunteer alfalfa - 2 to 20
  inches (5 to 50 cm) in
  height.

Canada thistle - after all thistles have emerged and when the majority are in the rosette to pre-bud stage;

0.17 L/acre - Provides top growth control of Canada thistle for 6 to 8 weeks.

0.23 L/acre - Provides season long control of Canada thistle. Not all root stalks will be killed and some regrowth may occur by the end of the growing season.

0.34 L/acre - Provides season long control of Canada thistle with suppression into the following year.

Cost (2002 suggested retail price):

$24.25 to $47.93/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to table 2 on page 29.

Effects of Growing Conditions:

Poor control may occur under dry conditions. Injury to flax may occur when tank mixing with MCPA. To reduce the risk of crop injury, do not apply tank mixes if temperature exceeds 27°C.

Tank Mixes:

Herbicides:

Lontrel applications following applications of products containing bromoxynil (Buctril M, Compas 480 EC, Pardner, Thumper, Hoegrass II) should be delayed by 14 days to allow the Canada thistle to recover from leaf burn.

Recommended rates of Lontrel may be used for each crop unless otherwise indicated.

In Canola:
Poast Ultra
Fusion (Lontrel at 0.23 L/acre)
Hoegrass 284 (Lontrel at 0.17 L/acre)
Roundup Original* /Transorb* (Lontrel at 0.112 L/acre)
Odyssey** (Lontrel at 0.17 to 0.23 L/acre)
Select
Vantage* /Vantage Plus* (Lontrel at 0.112 L/acre)
Venture DG

* Roundup Ready varieties only
** CLEARFIELD varieties only

In Flax:
MCPA amine or ester - 0.34 to 0.45 L/acre (Lontrel at 0.17 L/acre)
Poast Ultra
Poast Ultra + MCPA Ester (rates as above)
Select

In Spring wheat (NOT including durum) and barley:
2,4-D or MCPA (amine or ester) at label rates
(Lontrel at 0.085 L/acre)
Refine Extra (8 g/acre) + 2,4-D (0.28 L/acre - 600g/L formulation) plus non-ionic surfactant.
Refine Extra (8 g/acre) + MCPA (0.34 L/acre - 500g/L formulation) plus non-ionic surfactant.
Triumph Plus - 20 acres per case
(Lontrel at 0.11 to 0.17 L/acre)

In Oat:
MCPA amine or ester (Lontrel at 0.11 to 0.17 L/acre)

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Lontrel label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions.

General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Crops or areas treated with this product may be grazed immediately following treatment.

Recropping: Lontrel residues in the soil may affect succeeding crops. The year after application, replant to wheat, barley, oats, rye, flax, forage grasses, mustard or canola.

Do not use manure from animals fed or bedded with Lontrel-treated straw except on fields that are to be sown to Lontrel-tolerant crops.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: Avoid contamination of non-target land, water or irrigation ditches.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

MCPA

Herbicide Group – 4
(Refer to page 27)

Company:

InterAg
IPCO (IPCO & Weedaway brands)
NuFarm (NuFarm and Weedone brands)
NuGro (Wilson brands)
United Agri Products (Clean Crop brands)
Van Waters & Rogers (Guardsman brands)

Crops, weeds and rates and other application details may differ with different product labels. Consult specific product labels for more information.

Formulations:

500 g/L amine, 300 g/L sodium salt (Na) and 400 g/L potassium salt (K) formulated as solutions;

500 g/L ester formulated as emulsifiable concentrates. Container size - various.

Crops, Rates and Staging:

The maximum safe rates for various crops are given below. Higher rates used for harder to control weeds (see "Weeds, Rates and Staging") may cause crop injury. Application rates for individual products may vary from those listed. Refer to the label for product specific use rates. Rates greater than these for harder to control weeds may cause crop injury. When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

CROP	STAGE	RATE (L/ACRE)			
		AMINE	ESTER	K SALT	NA SALT
Wheat (spring and durum), barley, oats	3 leaf to early flag leaf.	0.45	0.45	0.71	0.81
Spring rye	2 leaf to early flag leaf.	0.45	0.45	NR	0.81
Flax	2 inches (5 cm) in height to prebud stage. Apply at 2 to 4 inches (5 to 10 cm) in height for maximum crop tolerance.	0.4	0.34	0.65	0.81
Winter wheat, fall rye	In spring, apply from the time growth commences until the early flag leaf stage. Winter wheat may be treated in the fall for winter annual weed control (caution: this is not a registered treatment, any such use is at the risk of the user).	0.45	0.45	NR	0.81
Corn	As a broadcast spray up to 6 – 7 in. (15 – 18 cm) tall or six leaf stage. Up to 3 weeks before tassling as a directed spray using drop nozzles.	0.45	NR	NR	0.74
Peas	Vines 4 to 7 inches (10 to 18 cm) long.For short-statured, determinate flowering peas, apply at the early stages within this range.	0.22*	NR	NR	0.36*
Cereals underseeded to alfalfa (not Flemish varieties)	Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage.	0.23	NR	NR	0.4
Underseeded alsike, ladino and red clover	Apply when the majority of seedling legumes are in the 1 to 3 trifoliate leaf stage.	0.28	NR	NR	0.4

Crops, Rates and Staging continued on next page.

Crops, Rates and Staging *continued*

CROP	STAGE	RATE (L/ACRE)			
		AMINE	ESTER	K SALT	NA SALT
Grass pastures	Spring or fall.	1.42	1.38	**NR**	2.8
Seedling forage** grasses (not for seed)	Apply from the 3 leaf stage to the shot blade stage.	0.45**	**NR**	**NR**	**NR**
Established forage** grasses(not for seed)	Apply in the spring up to the shot blade stage or in the fall after harvest.	0.45**	**NR**	**NR**	**NR**

NR = Not Registered

* The rates given are lower than the registered rates for peas. Less than the maximum label rates are recommended because of crop injury concerns.

** MCPA is NOT registered for use on forage grasses, any such use is entirely at the risk of the user.

Formulation Characteristics:

Formulation	Risk of Vapour Drift	Activity on Weeds	Risk of Crop Injury
LV Ester	Medium	Fast	Medium
Amine	Very Low	Medium	Low
Salts	Very Low	Slow	Very Low

Weeds, Rates and Staging:

Apply at lower rates when weeds are small (2 to 4 leaf stage) and actively growing. Higher rates are needed when weeds are larger, in heavy populations, or growing under stressful conditions (excessively cold, hot, dry or wet). Lower rates may be applied in late fall to control winter annual weeds.

+	Not controlled by MCPA K salt formulation
++	Not controlled by MCPA K or Na salt formulations

Susceptible weeds:

Amine and Ester formulations – 0.28 to 0.45 L/ac
K formulations – 0.61 to 0.71 L/ac
Na formulations – 0.5 to 0.81 L/ac

Burdock
Cocklebur
Flixweed (late fall applications or small seedlings)*
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Prickly lettuce+
Ragweed
Russian pigweed
Shepherd's purse*
Stinkweed*
Wild Radish
Wild Sunflower+

* Winter annual weeds

Harder to control weeds:

Amine & Ester formulations – 0.45 to 0.71 L/ac
K formulations – 0.71 to 0.81 L/ac
Na formulations –0.81 to 1.1 L/ac

Annual sow thistle+
Biennial wormwood+
Bluebur+
Common peppergrass+
Curled dock+
Flixweed (overwintered rosettes prior to bolting)+
Goat's-beard+
Goosefoot+
Hemp-nettle (suppression only)
Mustard (Dog and Tansy)+
Plantain+
Purslane+
Redroot pigweed+
Smartweed (annual)+
Tumble pigweed+

Top growth control only (rates as for harder to control weeds):

Blue lettuce+
Canada thistle
Dandelion++
Gumweed+
Field bindweed+
Hedge bindweed+
Hoary Cress+
Leafy spurge+
Perennial sow thistle+
Russian thistle++

Cost (2002 suggested retail prices):

MCPA amine - $6.65 to $7.15/L (500 g/L formulation)
MCPA ester - $7.60 to $8.45/L (500 g/L formulation)
MCPA sodium salt - $5.20 to $5.65/L (300 g/L formulation)
MCPA K - $5.95 to $6.90/L (400 g/L formulation)

Application Information:

Water Volumes:
Cereals, flax, pastures, forage grasses - 10 to 20 gallons/acre (45 to 90 L/acre).
Peas - 15 gallons/acre (70 L/acre).
Cereals underseeded to alfalfa, red and alsike clover - 15 to 20 gallons/acre (70 to 90 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Best weed control occurs when temperatures are above 21°C (daytime) or 10oC (night time) and humidity is above 70 percent. Do not apply if temperature exceeds 27°C. If applying to flax, injury and a delay in maturity may result from application under hot or humid conditions. Extremely hard water may reduce performance or cause problems in spraying the product.

Tank Mixes:

Herbicides:

In Wheat and barley:
Avenge (ester only),
Banvel II and Pardner (amine and K salt only),
linuron and Sencor (amine only)

In Oats:
Banvel II and Pardner (amine and K salt only)
Linuron and Sencor (amine only)

Not all brands are labelled for tank mixing. Check the product label prior to use for registered mixes and rates. Follow all precautions and restrictions on both labels.

Fertilizers: Liquid nitrogen (28-0-0) may be used in place of water as a carrier with certain amine formulations for application in spring to winter wheat or fall rye.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the MCPA labels only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours of MCPA Na salt or MCPA K salt, 4 hours of MCPA amine, or 2 hours of MCPA ester application will reduce control.

Grazing: Do not graze within 7 days of application.

Recropping: No restrictions the year after application.

Aerial Application: Some amine and MCPA K products may be applied by air. Check the label for detailed instructions. Storage: MCPA ester may be frozen. Do not freeze MCPA amine, MCPA sodium salt and MCPA K.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison

MCPB + MCPA

Herbicide Group – 4
(Refer to page 27)

Company:

IPCO (Clovitox Plus) Nufarm (Tropotox Plus)

Formulation:

375 g/L MCPB, 25 g/L MCPA present as sodium salts and formulated as a solution. Container size - 10 L.

Crops and Staging:

Registered for both Tropotox and Clovitox:

CROP	STAGE
Peas	3 to 6 expanded leaves
Clover (Alsike, Ladino, Red, White Dutch, Wild white)	Monofoliate to 3 trifoliate leaf stage (with or without a cover crop).
Oats, wheat, rye or barley (alone or as a companion crop)	2 leaf to flag leaf stage
Established pasture	After grazing or cutting when weeds have regrown to a susceptible stage

Tropotox only can be applied to the following seedling grasses at 1.11 to 1.42 L/acre from the 2 to 4 leaf stage:

- Bromegrass (smooth, meadow)
- Fescue (creeping red, meadow, tall)
- Green needlegrass
- Reed canarygrass
- Timothy
- Wheatgrass (crested, intermediate, northern, pubescent, slender, stream bank, tall, western)
- Wild ryegrass (altai, Russian)

Weeds, Rates and Staging:

WEEDS	RATE STAGE	(L/ACRE)
Ball mustard, Lamb's-quarters, Stinkweed, Wild mustard, Wormseed mustard	Seedlings	1.11
Annual sow-thistle*, Hempnettle*, Redroot pigweed, Ragweed, Shepherd's-purse, Volunteer rapeseed (including canola), Wild Radish*	Seedlings	1.72
Curled dock, Perennial sow-thistle**, Plantain	Rosette	1.72
Bull thistle	Rosette to early bud	1.72
Buttercup (Creeping, Tall), Field Bindweed	In spring during rapid growth	1.72
Canada thistle	6 inches (15 cm) to early bud	1.72
Horsetail	6 inches (15 cm)	1.72 *

* Suppression only
**Topgrowth control only

Cost (2002 suggested retail prices):

$12.10 to $13.20/L

Application Information:

Water Volume: 15 to 20 gallons/acre (70 to 90 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Damage to peas or seedling forage legumes may occur if the crop is sprayed when under drought or disease stress. Under extremely hot or humid conditions, crop injury may be severe. Best activity on weeds occurs in warm weather.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for hay in the year of establishment. Cereals or pastures treated with Tropotox may be used for grazing or cut for greenfeed or hay 30 days after application.

Recropping: No restrictions listed. Phenoxy herbicides can persist in soils for weeks, particularly if dry or cool weather persists.

Do not seed sensitive crops immediately after spraying.

Aerial Application: Clovitox may be applied by air to established pasture and cereal crops (not underseeded to clover.

Storage: Do not freeze.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

☠ Danger Poison - Clovitox

▽ Caution Poison - Tropotox Plus

Mecoprop

Herbicide Group – 4
(Refer to page 27)

Company:

United Agri-Products (Mecoprop)
Nufarm (Compitox)

Formulation:

150 g/L mecoprop present as potassium salt. Container size - 10 L.

Crops and Staging:

Spring wheat (including durum), barley and oats - 3 leaf to flag leaf stage.

Weeds and Staging:

Apply to weeds from the 2 to 4 leaf stage.

Black medic
Canada thistle
(top growth control only)
Chickweed
Cleavers
Clover (volunteer)
Corn spurry
Lamb's-quarters
Plantain
Wild mustard

Cost (2002 suggested retail price):

$6.50/L

Rates:

2.2 to 2.8 L/acre.

Use the high rate for weeds in an advanced stage of growth.

Application Information:

Water Volume: 20 to 30 gallons/acre (90 to 135 L/acre).

Pressure: 40 psi (275 kPa).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Apply in warm weather under good growing conditions. Avoid spraying in very hot weather or in drought conditions.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or feed treated crop to livestock prior to crop maturity.

Recropping: No restrictions the year after application.

Aerial application: Not registered.

Storage: Do not freeze.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

☠ Caution Poison

Muster Gold II

Herbicide Group – 1, 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulations:

Muster Gold II contains 3 components:

Muster - 75 percent ethametsulfuron-methyl as a water dispersible granule. Container size - 4 x 80 g water soluble bags (Muster Gold II)

Assure II - 96 g/L /quizalofop-p-ethyl as an emulsifiable concentrate. Container size - 8 L (both products).

Merge adjuvant. Container size - 8 L

Crops and Staging:

Canola, including all herbicide tolerant canola varieties.

2 leaf stage to the beginning of bolting. If application is made prior to this stage, severe crop injury may occur.

Weeds and Staging:

Grasses:

Apply at the 2 leaf to early tillering stage unless otherwise noted. For best results on volunteer cereals/wild oats apply before tillering begins

Barnyard grass
Fall pannicum
Green and yellow foxtail
Old witchgrass
Proso millet
Quackgrass* (2 to 6 leaf)
Volunteer cereals
Volunteer corn
Wild oat

Broadleaf weeds:

Apply at the cotyledon to 6-leaf stage unless otherwise noted.

Flixweed
Hemp-nettle
Redroot pigweed*
Stinkweed (1 to 4 leaf)
Wild mustard
Smartweed/lady's-thumb

*Suppression only

Cost (2002 suggested retail price):

$20.55/acre

Rates:

A box of Muster Gold II will treat 40 acres (16 ha).

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallon/acre (45 L/acre).

Pressure: 30 to 40 psi (210 to 275 kPa).

Nozzles: Flat fan nozzles with 50 mesh line strainers and screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop injury and reduction in control may occur if plants are under stress as a result of drought, frost, flooding, disease or insect injury. Less than acceptable control will occur on fields where high weed populations exist and where stressful environmental conditions prevail (drought, cold weather). Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Thin crop stands or application prior to the 2 leaf stage, sandy soils or soils with low organic matter may increase the severity of the injury.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Rainfall within 4 hours may reduce control.

Grazing: Do not graze or feed crop to livestock within 60 days of application.

Recropping: Interval prior to planting:

10 months - spring wheat, durum wheat, barley, flax, oats.

22 months - alfalfa, canarygrass, canola, drybeans, fababeans, fescue, lentils, peas, red clover, tame mustard. All other crops, a field bioassay is required at 22 months.

Aerial Application: Do not apply by air.

Storage: Store in a cool dry place

Environment: Do not mix or load within 30 m of wetland areas or bodies of water. Leave a 15 m buffer between the last spray pass and wetland areas or water bodies. Leave a 5 m buffer between the last spray pass and woodlots, shelterbelts, ditch-bank vegetation and the borders of dry sloughs.

Tank Cleaning:

To avoid injury to susceptible crops, thoroughly clean sprayer immediately after spraying. Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill the tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, and then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water (1 L of 3 percent ammonia in 100 L water). If the spray equipment is to be used to spray crops other than cereals, repeat the above process and thoroughly wash the spray mixture from the outside of the spray tank and the boom. Thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer again, flush the tank, boom and hoses for 5 minutes with fresh water.

Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

Hazard Rating:

Caution Poison

Warning Skin and Eye Irritant

Muster Toss-N-Go

Herbicide Group – 2
(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

75 percent ethametsulfuron-methyl formulated as a dry flowable.

Container sizes – 320 g package (containing 4 x 80 g water soluble bags).

Crops and Staging:

Canola - Crop must be in the 2 leaf stage (true leaves) to the beginning of bolting. Do not apply prior to this stage as severe crop injury can occur.

Condiment mustard (brown & oriental only) - Crop must be in the 4 leaf stage but prior to bolting. Do not apply prior to this stage as severe crop injury can occur. Spraying must take place at least 60 days prior to harvest.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Apply from the 2 to 6 leaf stage. Stinkweed must be sprayed in the 1 to 4 leaf stage

At the 8 g/acre rate (one 320 g package treats 40 acres):

Flixweed *
Green smartweed
Hemp-nettle
Stinkweed **
Wild mustard

The 12 g/acre rate (one 320 g package treats 26.7 acres)*** controls above weeds plus:

Stinkweed
Redroot pigweed **

* Spring seedlings only

** Suppression with Muster alone but control with Assure II plus Sure-Mix or a Poast Ultra + Merge tank mix.

*** High rate is for use in canola only. DO NOT use high rate on condiment mustard crops.

Muster applied alone requires the addition of Agral 90, Agsurf, or Citowett at 0.2 L per 100 L of spray solution. Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Cost (2002 suggested retail price):

$15.92 to $23.88/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Equipment and Nozzles: Flat fan nozzles. Sprayer must be equipped with continuous agitation. Use 50 mesh or coarser strainers and screens..

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not use on crops that are stressed because of drought or flooding. Less than acceptable control will occur in fields where high weed populations exist and where stressful environmental conditions prevail (drought, cold weather). Heavy rainfall soon after application may result in visual crop injury or possible yield reduction. Thin crop stands or application prior to the 2 leaf stage, sandy soils or soils with low organic matter may increase the severity of the injury.

Tank Mixes:

Do not mix with substances that contain boron or that release chlorine.

Herbicides: In Canola only - Muster may be tank mixed with Assure II, Poast Ultra or Select. No additional adjuvant is required with tank mixes.

Fertilizers: None registered. Do NOT mix soluble bags with liquid fertilizers.

Insecticides: None registered.

Note: The above mixes are those listed on the Muster label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 to 6 hours may reduce control.

Grazing: Do not graze or feed crop to livestock within 60 days of application.

Preharvest: 60 days

Recropping: Do not sow wheat, barley, oats or flax within 10 months of application. Do not sow canola, lentils, peas, fababeans, tame mustard, alfalfa, canaryseed, dry beans, fescues or red clover within 22 months of application. All other crops must not be sown until a "field bioassay" is performed at 22 months (or more) after application. Growers may experience reduced yields if other crops (such as corn) are grown without following these guidelines.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Environment: Leave a 15 m buffer between the last sprayer pass and wetland areas or waterways. Leave a 5 m buffer between the last spray pass and woodlots, shelterbelts, ditch bank vegetation and the borders of dry sloughs.

Tank Cleaning:

Sprayers used to spray Muster should be flushed out immediately after Muster is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1L of 3 % ammonia per 100 L water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

Caution Poison

Odyssey

Herbicide Group – 2

(Refer to page 27)

Company:

BASF Canada

Formulation:

35 percent imazamox and 35 percent imazethapyr formulated as a dispersible granule. Container size - 4 x 173 g water soluble bags and 1 x 8.1 L jug of Merge.

Crops and Staging:

Field peas - 1 to 6 above-ground nodes (1 to 6 true leaves).
CLEARFIELD canola - 2 to 6 leaf stage.

Temporary crop yellowing may be observed shortly after application in field peas and CLEARFIELD canola.

Forage Crops (seed production only)
Alfalfa (seedling or established) – 1 to 4 leaf stage

Weeds, Rates and Staging:

At 12 g/acre (60 acres/case), Odyssey will control:

Redroot pigweed
Wild mustard
Volunteer tame mustard

At 17 g/acre (40 acres/case), Odyssey will control:

Grasses - 1 to 4 main stem leaves, until tillers are visible:

Barnyard grass
Green foxtail
Persian darnel Wild oats
Volunteer cereals
(wheat, barley, oats)

Broadleaf Weeds - cotyledon to 4 leaf stage unless otherwise indicated:

Chickweed
Cleavers (up to 4 whorls)
Flixweed
Green smartweed
Hemp-nettle*
Kochia
Lamb's–quarters**
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Stork's-bill
Volunteer canola (not CLEARFIELD varieties)
Volunteer tame mustard
Wild buckwheat*
Wild mustard

* Suppression only in field peas.
** Suppression only in field peas and CLEARFIELD canola.

Apply with Merge at a rate of 0.5 L per 100 L spray solution.

Do not apply more than once per year.

Refer to the product label for complete mixing instructions for this product and its mixes.

A general guide to mixing can be found on page 13.

Cost (2002 suggested retail price):

$16.13 to $24.19/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan. Use 50 mesh or coarser filter screens..

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

No information provided on the product label. Plants are under stress when conditions before or after application are very hot or cold, or excessively dry or wet. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result.

Tank Mixes:

Herbicides:

In CLEARFIELD canola only: Lontrel (0.17 - 0.23 L/acre).

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for feed prior to crop maturity. Field peas may be fed to livestock 30 days after application. Do not harvest forage or cut for hay.

Preharvest Interval: Do not apply within 60 days of harvest.

Recropping: Field peas, CLEARFIELD canola, and spring wheat (including durum) may be grown the year after application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crops other than those listed above. Contact manufacturer for additional information on recropping intervals.

Aerial Application: Do not apply by air.

Storage: Do not freeze. Store in a cool, dry place above 5° C.

Environment: Avoid spraying in situations where drift may occur. Leave a buffer zone of at least 14 m between the outside boundary of the sprayed area and sensitive areas such as shelterbelts, hedgerows, wetlands, woodlots, vegetated ditch banks, ponds, streams, and sloughs.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Eye Irritant

Pardner/Koril 235

Herbicide Group – 6

(Refer to page 27)

Company:

Bayer CropScience (Pardner)
Nufarm (Koril 235)

Formulation:

Pardner: 280 g/L bromoxynil formulated as an emulsifiable concentrate. Container size - two 8 L containers per case.

Koril 235: 235 g/L bromoxynil formulated as an emulsifiable concentrate. Container size – two 9.71 L containers per case.

Crops and Staging:

CROP	STAGE
Barley*, oats*, triticale, wheat* (spring and durum)	2 leaf stage to early flag
Canaryseed	3 to 5 leaf
Corn* (field or sweet)	4 to 8 leaf
Corn* (field or sweet) with drop pipes	Beyond 8 leaf
Established alfalfa	In spring, before the crop begins to shield weeds. Apply no more than twice in one growing season.
Fall rye	In spring only, from first growth to early flag
Flax (including Solin)	2 to 4 inches (5 to 10 cm)
Winter wheat*	2 to 4 leaf stage (fall application) First growth to early flag leaf (spring application)
Seedling alfalfa	2 to 6 trifoliate leaf stage
Seedling grasses: Bromegrass, Creeping red fescue, Meadow fescue, Orchardgrass, Reed canary grass, Russian wild ryegrass, Timothy, Wheatgrass (crested, intermediate, slender, tall), Reed canary grass	2 to 4 leaf
Summerfallow	Apply according to weed stage

*Koril 235 is registered for use only on these crops.

Weeds and Staging:

Weeds controlled at the 1 to 4 leaf stage:

American nightshade
Bluebur
Cocklebur
Common ragweed
Cow cockle*
Green smartweed
Kochia**
Lady's-thumb
Pale smartweed
Pigweed
Stinkweed*
Russian thistle**
Wild mustard*

* Use high rate.
** Apply before plants are 2 inches high.

Weeds controlled at the 1 to 8 leaf stage:

Common groundsel
Lamb's-quarters
Tame buckwheat
Tartary buckwheat
Wild buckwheat

Cost (2002 suggested retail price):

Pardner: $8.53 to 10.22/acre.
Koril: $8.10 to $9.53/acre.

Rate:

Pardner: 0.405 to 0.485 L/acre (one 8 L container treats 20 to 16.5 acres).

Canaryseed, seedling alfalfa - 0.405 L/acre (one 8 L container treats 20 acres).

Other uses: - 0.405 to 0.485 L/acre

Koril 235: 0.48 to 0.56 L/acre (one 9.71 L container treats 20 to 17 acres).

Use the higher rates if weeds are at the more advanced stages of the recommended treatment stages.

Application Information:

Water Volume:
Corn - 20 to 30 gallons/acre (90 to 135 L/acre).
Seedling grasses - 15 gallons/acre (70 L/acre).
Other crops - 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Avoid spraying if temperatures are greater than 25°C. Leaf scorching may occur in corn if applied during or after adverse growing conditions, such as cool and wet or hot (greater than 27°C) and humid weather.

Tank Mixes:

Pardner Herbicide Tank Mixes :

CROP	PARDNER TANK MIXES
Spring wheat	2,4-D, Achieve, Avenge, Avenge + MCPA (ester only), MCPA, Hoe-Grass 284
Winter wheat	2,4-D, Achieve, MCPA
Barley	2,4-D, Achieve, Avenge, Hoe-Grass 284, Avenge + MCPA (ester only), MCPA
Oats	MCPA
Fall rye, canaryseed, seedling forage grasses	MCPA*
Corn (do not add oil or surfactant)	Atrazine, Banvel II (field corn only)

* The ester formulations are preferred but other formulations can be used

Koril 235 Herbicide Tank mixes:
MCPA (wheat, barley and oats)
2,4-D (wheat and barley)
atrazine (corn only)

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: None registered.

Note: The above mixes are those listed on the Pardner/Koril labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour of application will reduce control.

Grazing: Do not graze treated wheat, barley, oats or seedling alfalfa crops or cut for feed within 30 days of application. Do not graze other treated crops or cut for hay prior to crop maturity.

Recropping: No restrictions.

Aerial Application: Registered for aerial application on wheat and barley. The use of low water volumes (2 to 4 gallons/acre - 9 to 18 L/acre) may result in less effective weed control than seen with ground application.

Storage: May be stored at freezing temperatures. Will return to original state by warming to room temperature (20 to 22°C) and agitating thoroughly.

Environment: Avoid drift onto sensitive plants and contamination of water or wetland areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison

Pea Pack

Herbicide Group – 4, 5

(Refer to page 27)

Company:

Bayer CropScience

Formulation:

Sencor 75DF: (75 percent metribuzin formulated as a dispersible granule). Container size - 3 kg.

MCPA sodium salt: (300 g/L MCPA sodium salt) formulated as a solution. Container size - 7.6 L.

Crops and Staging:

Field peas before vines are 6 inches (15 cm) long.

DO NOT USE ON LENTILS OR CHICKPEAS.

Do not use on peas seeded less than 2 inches (5 cm) deep or on soils with less than 4 percent organic matter.

Weeds and Staging:

Apply when weeds are small i.e. less than 2 inches (5 cm) in height or diameter.

Lamb's-quarters
redroot pigweed
stinkweed
volunteer canola (including all herbicide-tolerant canola cultivars),
wild mustard.

Cost (2002 suggested retail price):

$5.95/acre.

Rate:

77 g Sencor DF and 189 mL MCPA sodium salt per acre. Each case will treat 40 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 15 gallons/acre (70 L/ha)

Pressure: 30-40 psi (200-275 kPa)

Nozzles: Flat fan nozzles with an opening no smaller than 8002 or TK2 with 50 mesh screen. Angle nozzles 45° forward.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Crop height reductions or yellowing may occur if high temperatures occur within 48 hours of application. Cold, cloudy weather or frost within 3 days of application may also aggravate crop injury. If frost occurs, allow 4 to 5 days for crop to recover prior to applying Sencor. Applications made under conditions of high humidity may cause pea vines to droop, but the crop will recover quickly.

Tank Mixes:

None registered.

Allow 4 to 5 days between applications of Pea Pack and the application of another pesticide.

Restrictions:

Rainfall: Rainfall within 6 hours of application may reduce control.

Grazing: Do not graze treated crops within 30 days of application, or peas within 70 days of application.

Preharvest Interval: Do not harvest peas within 70 days of application.

Recropping: There are no recropping restrictions the year following application.

Storage: Do not freeze.

Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining solution from the spray tank. Rinse the spray tank and refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for 5 minutes and spray out. Repeat this procedure twice. Fill the spray tank with clean water, recycle for 5 minutes, and spray out. Clean pump and nozzle screens thoroughly.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent.

Refer to page 14 for additional information.

Hazard Rating:

◈ Warning Poison

Pinnacle

Herbicide Group – 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

75 percent thifensulfuron methyl as a water dispersible granule. Container size – 8 x 8 g water soluble pouches

Crops and Staging:

Soybeans - First fully expanded trifoliate leaf to flower initiation.

Weeds and Staging:

Apply up to 4 inches (10 cm) tall or wide:

Lady's-thumb
Lamb's-quarters*
Redroot pigweed
Wild mustard
Velvetleaf*

* High rate of application only

Cost (2002 suggested retail price):

$9.11 to $13.25/acre.

Rates:

2.2 to 3.2 g/acre (one container treats 20 to 28.5 acres). Requires the addition of a non-ionic surfactant such as Agral 90, Agsurf, or Citowett at 1 L per 1000 L of spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: Minimum of 10 gallons / acre (45 L / acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat Fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Pinnacle applied to crops that have been under stress before application may result in crop injury. Stress conditions within 3 days after application may also result in crop injury.

Weeds under stress conditions at the time of application may not be adequately controlled.

Stress conditions are severe weather conditions, frost, low fertility, drought, water-saturated soils, and disease or insect damage.

Injury symptoms can be crop discoloration (yellowing, purpling or reddening), or stunting.

Tank Mixes:

Herbicides:

Assure II at 0.2 L/acre with the addition of Sure-Mix at 0.5 L per 100 L of spray solution.

Basagran at 0.71 to 0.91 L/acre plus Assist at 0.405 to 0.81 L/acre.

Fertilizers: None.

Insecticides: None

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: If rainfall occurs soon after application control may be reduced. Several hours of dry weather are needed after application to allow uptake by the plants.

Grazing: Do not graze or cut for feed.

Pre-harvest interval: Must not be harvested within 60 days of application.

Recropping Interval: Do not plant any crop other than wheat or barley for 30 days after application.

Aerial Application: Do not apply by air.

Storage: Store in closed original container in a dry area away from food or feed.

Environment: Do not mix, load or apply within 15 m of water bodies, wetlands or sensitive plants. Do not apply to irrigated land where the drainage water is also used to irrigate cropland.

Tank Cleaning:

Pinnacle can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Pinnacle should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1 L of 3 percent ammonia per 100 L of water). All nozzles, screens and filters should be removed and clean separately during the cleaning process.

Refer to page 14 for additional information.

Hazard Rating:

Warning – Eye and Skin Irritant

Poast Ultra

Herbicide Group – 1
(Refer to page 27)

Company:

BASF Canada

Formulation:

450 g/L sethoxydim formulated as an emulsifiable concentrate.

Container size - 7.7 L jug of Poast Ultra and 2 x 8.1 L jugs of Merge.

Crops, Rates and Staging:

Crops are tolerant at all growth stages. However, the preharvest interval outlined in the "Restrictions:" section must be followed to avoid unacceptable residues of sethoxydim in harvested crops.

Check tank mix partner for additional staging restrictions.

To a maximum rate of 0.45 L/acre:

Alfalfa
Alsike clover*
Canola
Chickling vetch
Cicer milkvetch*
Creeping red fescue
  (for seed only)
Dry beans (adzuki, kidney,
  lima, mung, white)
Dry field peas
Fababeans
Flax
Lentil
Mustard
Potatoes
Sainfoin*
Shelterbelts
Soybeans
Sunflower
Sweet clover*

To a maximum rate of 0.26 L/acre:

Alsike clover**
Caraway
Cicer milkvetch**
Coriander
Dill
Safflower
Sainfoin**
Solin (low linolenic flax)
Sweet clover**

To a maximum rate of 0.23 L/acre:

Tame buckwheat

To a maximum rate of 0.19 L/acre:

Chickpea

* Established stands
**Seedling stands

Weeds, Rates and Staging:

Optimum yield response occurs when weeds are controlled early.

WEEDS AND STAGES	RATE (L/ACRE)	ACRES TREATED PER 7.7 L CONTAINER
Green or yellow foxtail, barnyard grass, volunteer corn, Persian darnel, proso millet, witchgrass, large crabgrass and fall panicum - 1 to 6 leaf stage	0.13	60
Wild oats, Volunteer wheat, oats and barley - 1 to 6 leaf stage except for low rate (See footnote)	0.13* or 0.19	60 or 40
Quackgrass suppression - 1 to 3 leaf stage	0.19	40
Quackgrass (season long control) - 1 to 3 leaf stage	0.45	17
Foxtail barley suppression - prior to tillering.	0.45	17

*Use the low rate in canola, flax and peas when wild oat, volunteer wheat and volunteer barley are from 1 to 4 leaves (best results prior to tillering) and under ideal growing conditions (adequate moisture, good fertility and moderate temperatures - 15 to 28°C). Do not apply under stress conditions.

Merge should be added at rates of 0.20 to 0.40 L/acre when using water volumes of 5 to 10 gallons/acre (23 to 45 L/acre). When using water volumes of 10 gallons/acre (45 L/acre) or higher, add Merge at a rate of 0.40 L/acre. When spraying quackgrass and foxtail barley, Merge should be added at 0.40 to 0.80 L/acre.

Cost (2002 suggested retail prices):

$10.66 to $37.61/acre.

Application Information:

Water Volume: 5 to 20 gallons/acre (23 to 90 L/acre). Use a minimum of 10 gallons/acre (45 L/acre) if crop or weed growth is dense, and when spraying quackgrass. Use 5 to 10 gallons/ acre (23 to 45 L/acre) when using the 0.32 L/acre rate for wild oats, volunteer wheat and volunteer barley.

Pressure: 40 to 45 psi (275 to 300 kPa).

Nozzles: Stainless steel 80° or 110° flat fan nozzles tilted forward at an angle of 45°.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Most effective control will be achieved when grasses are actively growing. Do not apply to grasses stressed more than 20 days because of lack of moisture. Control may be reduced if temperatures are below 15°C. Retillering may occur under stress conditions or if fertility is low.

Tank Mixes:

Herbicides: The following tank mixes can be applied with 0.13 to 0.18 L/acre of Poast Ultra. Include Merge at 0.3 to 0.4 L/acre with all mixes.

In Flax:

Buctril M (0.405 L/acre) (including Solin - low linolenic flax)
Lontrel 360 (0.23 to 0.34 L/acre)
Lontrel 360 (0.23 to 0.34 L/acre) + MCPA Ester (0.34 to 0.45 L/acre of 500 g/L formulations)

MCPA Ester (up to 0.45 L/acre of 500 g/L formulations)
The above tank mixes may reduce grass control, especially under adverse weather conditions.

In Canola:

Lontrel (0.17 to 0.19 L/acre)
Muster (8 to 12 g/acre)
Lontrel (0.17 L/acre) + Muster (8 g/acre) (Poast Ultra at 0.13 L/acre only)

In Liberty Link canola only:

Poast Ultra at 1.08 L/acre + Liberty at 1.1 L/acre.

In Field peas and CLEARFIELD canola:

Poast Ultra at 0.19 L/acre plus Merge at 0.16 L/acre may be tank mixed with the following herbicides:

Pursuit at 0.04 L/acre to control:
Chickweed, stinkweed, cleavers, volunteer canola (non-CLEARFIELD varieties), hemp-nettle (peas only), redroot pigweed (light infestations only), wild buckwheat (light infestations only) smartweed, wild mustard.

The company does not provide guidelines for weed densities under light infestations. When in doubt, use the higher rate below or contact the manufacturer.
Pursuit (0.085 L/acre) for all weeds on the Pursuit label. Check label directions for mixing order and additional timing restrictions for broadleaf partners.

Allow 4 days between application of Poast Ultra and application of herbicides other than those registered for tank mixing. Allow 5 days between application of Sencor and Poast Ultra. Allow 14 days for regrowth when applied in sequence with a grass control herbicide.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Poast Ultra label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour of application may reduce control.

Grazing: Do not graze the treated crop or cut for feed prior to crop maturity. Forage legumes may be cut after the specified preharvest interval.

Preharvest Interval: Forage legumes - 30 days; Dry peas & flax - 60 days; Lentil & chickpea - 65 days; Canola, chickling vetch & alfalfa - 70 days; Potatoes, dry beans, soybeans, & fababeans - 80 days; Solin - 86 days; Safflower - 90 days.

Recropping: Do not sow cereal or grass crops within 14 days of Poast Ultra application.

Aerial Application: May be applied by air in 2.2 to 4.4 gallons/ acre (10 to 20 L/acre) of water. Merge should be added at rates of 0.10 to 0.20 L/acre.

Storage: May be frozen.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

PrePass

Herbicide Group – 2,9
(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

Each case of PrePass will contain 2 components:

Florasulam SC: 50 g/L florasulam formulated as a suspension concentrate.

Vantage Plus: 360 g/L glyphosate IPA salt formulated as a solution.

Container sizes: Florasulam SC - 1.6 L, Vantage Plus - 2 x 10 L.

Crops and Staging:

Prior to seeding spring wheat (including durum), barley and oats.

Weeds Controlled and Staging:

Grasses at the 1 to 4 leaf stage:

Crabgrass
Downy brome
Green foxtail
Persian darnel
Volunteer barley
Volunteer wheat
Wild oat

Broadleaf weeds controlled at the 1 to 4-leaf stage:

Canada fleabane
Cleavers
Dandelion*
Flixweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Narrow-leaved hawk's-beard
Ragweed (common)
Redroot pigweed
Russian thistle
Shepherd's-purse
Stinkweed
Volunteer canola (all varieties)
Volunteer flax
Wild buckwheat***
Wild mustard

Broadleaf weeds suppressed:

Dandelion**

* seedlings and rosettes up to 15cm (6 inches) across
** rosettes greater than 15cm (6 inches) across
*** up to 6 leaf stage

Cost (2002 suggested retail price):

$8.95/acre.

Rate:

Florasulam SC: 0.04 L (40 mL)/acre

Vantage Plus: 0.5 L/acre

One case treats 40 acres

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13 of the Guide to Crop Protection.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Use nozzles capable of delivering appropriate pressures and volumes.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Florasulam SC: Warm, moist growing conditions promote active weed growth and enhance activity. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and re-growth may occur.

Vantage Plus: Best results are achieved when temperatures are near 20oC and when weeds are actively growing. Frost that kills more than 40% of above ground tissue will reduce control. Heavy dust layer on leaves will also reduce control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Florasulam SC: No rainfast period is specified for this product; required interval may be up to 8 hours. Vantage Plus: Heavy rainfall immediately after application may wash the chemical off the foliage. Do not apply if rainfall is forecast for the time of application. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for feed within 7 days of application.

Pre-harvest: Do not apply within 60 days of harvest.

Recropping: Wheat, barley, oat, may be seeded immediately after application. Canola, flax, mustard, lentil, chickpea, dry beans and peas may be grown the 12 months following an application:

Aerial Application: Do not apply by air.

Storage: Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

Environment: Leave a buffer zone of at least 30 m between the downwind edge of the boom and the closest edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrub lands. A buffer zone of at least 5 m is required between the downwind edge of the boom and the closest edge of aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

▽ Caution Poison

May cause eye irritation

Prestige

Herbicide Group – 4

(Refer to page 27)

Company:

Dow AgroSciences.

Formulation:

Prestige A: 180 g/L fluroxypyr. Container size – 6.4 L.
Prestige B: 50 g/L clopyralid and 280 g/L MCPA ester. Container size – 2 x 8.0 L.

Both are formulated as an emulsifiable concentrate.

Crops and Staging:

Spring wheat (not including durum) and barley from the 3 leaf stage up to the emergence of the flag leaf.

Weeds and Staging:

Unless otherwise stated, the following weeds will be controlled if sprayed in the 2 to 4 leaf stage.

Annual sow-thistle
Canada thistle*
Chickweed**
Cleavers (1-4 whorls)
Common groundsel
Dandelion***
Flixweed***
Hemp-nettle (2-6 leaf stage)**
Kochia
Lamb's-quarters
Perennial sow-thistle*
Redroot pigweed
Round leaved mallow (1 to 6 leaf)
Russian pigweed
Scentless chamomile
Shepherd's-purse
Smartweed
Stinkweed
Stork's-bill (1-8 leaf)
Tartary buckwheat
Volunteer canola
Volunteer flax (1-12 cm)
Volunteer sunflower
Wild buckwheat (1-4 leaf)
Wild mustard

* Spray when 4-6 inches (10-15 cm) high. Season long control, with some regrowth in the fall.

** Suppression only. Spray as late as possible (within recommended stages) to ensure the majority of weed flushes have emerged.

*** Spring rosettes only.

Cost (2002 suggested retail price):

$14.25/acre.

Rates:

Prestige A: Apply at 0.32 L/acre

Prestige B: Apply at 0.8 L/acre

One case of Prestige will treat 20 acres.

Application Information:

Water Volume: 10 gal/acre (45 L/acre)

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan nozzles tilted forward at a 45° angle.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

The activity of the Prestige is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought or heat stress) or if heavy infestations exist.

Tank Mixes:

Herbicides:
In spring wheat (NOT including durum) and barley:
Achieve 80DG (0.1 kg / acre) plus Turbocharge adjuvant
Assert (0.53 to 0.65 L / acre) plus acidifier
In spring wheat (Not including durum):
Horizon (95 to 115 mL / acre) plus Score adjuvant
Puma^{120} Super (0.16 to 0.32 L / acre)

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Prestige label only. For other possible mixes see the blue fold out chart inside back cover.

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours of post-emergent application may result in reduced weed control.

Grazing: Do not cut or graze treated fields of wheat or barley for 7 days after application.

Preharvest Interval: Do not harvest crop within 60 days of application.

Recropping: Wheat, oats, barley, rye, flax, canola, field peas and mustard may be seeded the season following Prestige application. Do not seed crops other than those listed above until the second season following the Prestige application.

Aerial Application: Do not apply by air.

Storage: Store product in original containers in a secure, dry, heated area. If the product is frozen, bring to room temperature and agitate before use.

Environment: This product contains elements that are toxic to aquatic organisms and can damage susceptible non-target plants. Leave a 15 metre buffer between the nearest sprayer pass to non-target areas and domestic, irrigation or natural water or other wetland areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

☠ Danger Poison.

Warning Eye Irritant.

Caution Skin Irritant.

Prevail

Herbicide Group – 1, 4

(Refer to page 27)

Company:

Dow AgroSciences.

Formulation:

The Prevail package contains 3 components:

Prevail A: 80 percent tralkoxydim formulated as a dispersible grain. Container size - 2 kg.

Prevail B: 50 g/L clopyralid plus 280 g/L MCPA ester formulated as an emulsifiable concentrate. Container size - 8 L.

Prevail C: adjuvant. Container size - 4 L.

Crops and Staging:

Spring wheat (including durum) and barley at the 3 to 6 leaf stage.

Weeds and Staging:

Grasses:
Wild oats - 1 to 6 leaf stage (total leaves including tillers), with a maximum of 2 tillers.
Green foxtail - 1 to 5 leaf stage (total leaves including tillers), with a maximum of 1 tiller.
Persian darnel - 1 to 4 leaf stage (total leaves including tillers).
Optimum weed control and yield response occurs when weeds are removed before tillering.

Broadleaves:

Apply at the 1 to 4 leaf stage unless otherwise indicated

- Annual sow-thistle
- Canada thistle*
- Common groundsel
- Dandelion***
- Flixweed***
- Kochia (suppression)◊
- Lamb's-quarters
- Perennial sow thistle**
- Redroot pigweed
- Russian pigweed
- Scentless chamomile◊
- Shepherd's-purse***
- Smartweed
- Stinkweed***
- Tartary buckwheat
- Wild buckwheat
- Wild mustard
- Volunteer canola

* Season long control, some regrowth may occur in the fall. Apply after all the thistles have emerged and are 4 inches (10 cm) tall but prior to bud stage.

** Top growth control only.

*** Spring rosettes only.

◊ 2 to 4 leaf stage.

Cost (2002 suggested retail price):

$25.50/acre.

Rate:

The Prevail package will treat 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° flat fan nozzles. All strainer and nozzle screens must be 50 mesh or coarser.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Unacceptable crop injury (crop yellowing, stunting) can occur if Prevail is applied when temperatures of 5°C or below occur within 48 hours of application. Do not apply Prevail if the crop is under stress from extreme drought or excessive moisture conditions. Weed control could be reduced if weeds are stressed because of drought, flooding or prolonged hot or cool temperatures.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Allow a minimum 7 day interval between the application of Prevail and any other pesticide. Apply Prevail 7 days before any other herbicide.

Restrictions:

Rainfall: Within 6 hours may reduce control.

Grazing: Do not graze treated crops or cut for livestock feed. Do not feed straw treated with Prevail.

Preharvest Interval: Do not apply within 60 days of harvest.

Recropping: Wheat, barley, oats, rye, corn, flax, canola, field peas (minimum 10 months), mustard, and forage grasses may be seeded the following year.

Do not seed lentils, sunflowers, beans, alfalfa, or clover crops the following year.

Aerial application: Do not apply by air.

Storage: If any component is frozen, bring to room temperature and agitate.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Warning Eye and Skin Irritant

Primextra II Magnum

Herbicide Group – 15, 5
(Refer to page 27)

Company:

Syngenta

Formulation:

400 g/L of s-metolachlor + 313 g/L of atrazine formulated as a liquid. Container size - 14 L.

Crops and Staging:

Corn - Preplant incorporated (PPI) or Pre-emergence if irrigated within 10 days of application.

Weeds and Staging:

Apply prior to the emergence of weeds. Weeds that have emerged prior to application will not be controlled.

American nightshade
Barnyard grass
Buckwheat
Eastern black nightshade
Green foxtail
Lady's-thumb
Prostrate pigweed
Purslane
Ragweed
Redroot pigweed
Smartweed
Wild mustard
Yellow foxtail
Yellow nutsedge*

* Herbicide must be incorporated for best control.

Cost (2002 suggested retail price):

$21.66 to $28.89/acre.

Rates:

WEED POPULATIONS	RATE (L/ACRE)	ACRES TREATED PER 10 L CONTAINER
Light infestations	1.2	11.7
Medium infestations	1.4	10
Heavy infestations	1.6	8.8

Application Information:

Water Volume: 15 gallons/acre (70 L/acre).

Pressure: 30 to 45 psi (200 to 300 kPa).

Nozzles: Flat fan with 50-mesh nozzle screens.

Incorporation:

Incorporate using S-tine or C-tine cultivators or tandem disk. Do not incorporate deeper than 4 inches (10 cm).

To ensure that the product remains in the top 2 inches (5 cm) of soil, apply to a firm seedbed free of large clods or lumps. If using tandem disks, set disks to work the soil at a depth of 4 inches (10 cm) and operate at a speed of 4 mph (6 km/hr). If using an S-tine cultivator, set the implement to work the soil to a depth of 4 inches (10 cm) and operate at a speed of 6 mph (10 km/hr).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Extended periods of dry soil conditions may result in reduced weed control. Moderate rainfall after application will enhance activity. Heavy rainfall following application of Primextra II Magnum may dilute the metolachlor deeper than 2 inches (5 cm) and result in reduced weed control, particularly on light textured soils.

Tank Mixes:

Herbicides: None registered.

Fertilizers: May be tank mixed with liquid fertilizer for preplant incorporated applications. Conduct a compatibility test by performing a jar test prior to mixing the products in the tank. May be impregnated onto dry bulk fertilizers (except nitrate or superphosphate fertilizers).

Insecticides: None registered.

Note: The above mixes are those listed on the Primextra label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Moderate rainfall shortly after application will enhance activity. Heavy rainfall reduces weed control by leaching the chemical out of the top few centimetres of soil. Inadequate rainfall after application (within 10 days) will cause reduced weed control.

Grazing: Do not graze or cut corn for feed before ear emergence.

Recropping: This product contains Atrazine. All crops except corn and triazine-tolerant canola may be affected the year following the use of Atrazine. Other more sensitive crops may be affected two or more growing seasons after application.

Aerial Application: Do not apply by air.

Storage: Store in a dry place.

Environment: Do not mix or load this product within 30 m, or apply within 10 m, of any wells, lakes, streams, ponds, dugouts or sink holes.

Tank Cleaning:

Refer to page 14.

Hazard Rating

Keep out of reach of children.

Princep Nine-T/Simazine 480/ Simazine 80W

See Simazine on page 194.

Prism

Herbicide Group – 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

25 percent rimsulfuron formulated as a dry flowable. Container size - 480 g.

Crops and Staging:

Irrigated potatoes prior to flower initiation.

Potato tolerance to Prism differs by variety. Limit first use of Prism to a small area of each variety prior to adoption as a field practice. Delay cultivation for 7 to 10 days after application.

Weeds and Staging:

WEED	STAGE
Barnyard grass Green foxtail Yellow foxtail	1 to 6 leaf stage, maximum 2 tillers
Quackgrass	3 to 6 leaf stage (less than 10 inches or 25 cm leaf extended).
Redroot pigweed Lamb's-quarters (suppression only)	4 to 6 leaf stage (less than 4 inches or 10 cm tall or across).

Cost (2002 suggested retail price):

$18.72/acre (plus adjuvant).

Rates:

24 g/acre. Add a recommended non-ionic surfactant such as Citowett Plus, Agsurf, or Agral 90 at 0.2 L per 100 L spray solution. 1 container treats 20 acres. Delay cultivation for 7 to 10 days after application. Make only one application per growing season.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 25 to 40 psi (175 to 275 kPa).

Nozzles: Flat fan. 50 mesh screens or coarser.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Apply Prism when the temperature 24 hours before and after application is between 5°C and 28°C. Temperatures beyond this range increase the potential for crop injury. Rapid fluctuations in temperature will stress the crop (greater than a 20°C difference within 24 to 36 hours). Allow 48 to 72 hours for the crop to acclimatize before spraying Prism if severe temperature fluctuations occur. Crop injury may result if applications are made when potatoes are stressed by abnormally hot, humid, or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If potatoes have been injured by frost, wait 48 to 72 hours after normal growing conditions have resumed before applying Prism.

Warm, moist conditions after application promote good weed control with Prism while cool and/or dry conditions may reduce or delay activity. Weeds hardened off by cold weather or drought stress may not be controlled.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 2 to 4 hours of application may reduce weed control.

Preharvest: Do not apply within 30 days of harvest.

Recropping: Spring barley, soybeans, white beans, red clover, sorghum, potatoes and field corn may be planted the year after application. Winter wheat may be planted 4 months after application. For all other crops, a field bioassay is recommended before planting.

Aerial application: Do not apply by air.

Storage: May be frozen.

Environment: Do not apply in areas where surface water from the treated area can run off to adjacent cropland, streams, irrigation water or wells. Leave a buffer of 10 m from the last spray pass and wetland areas or bodies of water. Leave a buffer of 5 m from the last spray pass and woodlots or shelterbelts.

Tank Cleaning:

Do not clean equipment near desirable trees or other plants. Do not contaminate water sources. Drain tank, hose down tank interior and flush clean water through hoses for a minimum of 5 minutes. Add water and houshold ammonia (1 L of 3 percent household ammonia per 100 L water) to spray tank. Flush hoses and nozzles, and add water to fill tank. Circulate cleaning solution for 15 minutes, and flush through boom again. Wash nozzles and screens in water/ammonia mix in pail. Repeat above tank and hose cleaning procedure. Rinse system with clean water for 5 minutes. Prior to using sprayer for next application, flush system with fresh water for 5 minutes.

Refer to page 14 for additional information.

Hazard Rating:

Warning Eye Irritant

Puma^{120} Super

Herbicide Group – 1
(Refer to page 27)

Company:

Bayer CropScience

Formulation:

120 g/L fenoxaprop-p-ethyl formulated as an emulsifiable concentrate. Container sizes – 6.2 L, 99.3L

Crops and Staging:

Spring wheat (including durum) with 1 to 6 leaves on the main stem plus 3 tillers

Barley* with 1 to 5 leaves on the main stem plus 2 tillers.

***Apply to barley only when tank mixed with a registered broadleaf product.**

Durum wheat and barely may experience some initial, temporary stunting and yellowing that rarely results in yield loss. Injury is more likely under stress conditions (see Effect of Growing Conditions).

Treatment at the 3 to 4 leaf stage of crops and weeds will maximize crop tolerance and weed control. Temporary crop injury such as shortening or discolouration may be observed after application. Such injury is more likely to occur in barley and also when Puma^{120} Super is applied outside recommended stages.

Cost (2002 suggested retail price):

$8.17 to $16.33/acre

Weeds, Rates and Staging:

WEEDS	RATE (L/ACRE)	AREA PER 6.2 L	STAGE*
Green foxtail only	0.154	40	1 to 6 leaf stage up to emergence of 3rd tiller
Low wild oat infestations	0.268	23.1	
Moderate-heavy wild oat infestations, barnyard grass, green and yellow foxtail	0.31	20	

* Apply at the 3 to 4 leaf stage for optimum control. Optimum weed control and yield response occurs when weeds are removed before tillering.

Application Information:

Water Volume:

Ground application: 5-10 gal/acre (23-45 L/acre)
Aerial application: A minimum of 3 gal/acre (14 L/acre).

Pressure:

Ground application: 40 psi (275 kPa)
Aerial application: 42 psi (300 kPa)

Nozzles:

Ground application: 80° or 110° flat fan nozzles tilted forward at a 45° angle. Do not use flood jet nozzles, controlled droplet application equipment or Sprafoil equipment.

Aerial application: Use a combination of nozzles and pressure for a coarse droplet size distribution (400-800 microns).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

DO NOT apply Puma^{120} Super 2-3 days prior to, or following, temperatures of 3°C or lower as crop injury may occur. Under stressful conditions (hot/dry, waterlogging, disease or insect damage) or heavy crop canopy, early application will improve weed control.

Do not apply by air when both the temperature is greater than 25°C and the relative humidity is less than 30%.

Tank Mixes:

Herbicides:

In Spring Wheat, Durum Wheat and Barley:

NOTE: Do NOT apply Puma^{120} Super alone in barley. ALWAYS tank mix with a registered broadleaf herbicide.

2,4-D Ester LV 600 (0.28 L/acre), LV 700 (0.24 L/acre)
Ally (2 to 3 g/acre)
Buctril M (0.4 L/acre)
*Buctril M (0.40 L/acre) + Refine Extra (2.7 g/acre)
Curtail M (0.6*** to 0.8 L/acre)
Dichlorprop D (0.71 L/acre)
**DyVel (0.5 L/acre)
Estaprop (0.7 L/acre)
**Express Pack (40 acres/case rate)
MCPA Amine or Ester (0.34 L/acre)
Prestige (20 acres/case rate)
Refine Extra (8 g/acre)
Refine Extra (8 g/acre) + MCPA Ester (0.34 L/acre)
Thumper (0.40 L/acre)
Unity (40 acres/case rate)

In Spring and durum wheat:

**DyVel DS (0.44 L/acre)
Lontrel 360 (0.17 L/acre)
*Lontrel 360 (0.17 L/acre) + MCPA Ester (0.34 L/acre)
*Lontrel 360 (0.112 L/acre) + MCPA Ester (0.34 - 0.45 L/acre)
*Mecoprop (2.2 to 2.8 L/acre)

In Spring wheat only (not including durum):

Attain (40 acres/case rate)
Prestige (20 acres/case rate)

* Use only at the high rate of Puma^{120} Super
In barley use only at the high rate of Puma^{120} Super
** Use only at the green foxtail rate of Puma^{120} Super
***Use marked rate on barley only

Fertilizers: None registered

Insecticides: None registered

Note: The above mixes are those listed on the Puma^{120} Super label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Leave an interval of 7 days prior to application or 4 days after application of Puma^{120} Super, when applying any pesticide that is not registered as a tank mix.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Grazing: Do not graze or cut for hay, crops that have been treated with Puma^{120} Super.

Preharvest Interval: Do not harvest within 65 days of application .

Recropping: No restrictions in the year after application. Only one application may be made per year.

Aerial Application: May be applied by air.

Storage: Do not freeze.

Environment: Do not apply within 10 metres of non-target land areas and 3 metres of water or wetland areas when using ground equipment. For aerial application, leave a buffer zone of 100 metres between the last spray swathe and sensitive, non-target areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

☠ Caution Poison.

Eye and Skin Irritant.

Pursuit

Herbicide Group – 2
(Refer to page 27)

Company:

BASF Canada

Formulation:

240 g/L imazethapyr formulated as a liquid.
Container size - 3.3 L.

Crops and Staging:

CROP	STAGE
CLEARFIELD canola	Apply after the first leaf stage.
Dry beans (pinto, pink and red varieties only)	Up to and including the second trifoliate leaf stage
Field peas	May be applied up to the sixth above-ground node stage (6 true leaves).
Seedling alfalfa (forage or seed production)*	Apply after the first trifoliate leaf stage.
Established alfalfa (seed production only)**	Apply before alfalfa reaches 12 inches (30 cm) in height.
Chickling vetch grown for seed	Apply at the 5 - 7 leaf stage.

* Apply only to seedling alfalfa that will remain in production for at least 3 years following application. Apply only once during the life of the alfalfa stand. Do not apply in the last year of established alfalfa stands.

Do **NOT** use in the brown or dark brown soil zones (except for use in dry beans and alfalfa under irrigated brown soils); rotational crops may be severely injured due to carryover in these soils.

Weeds and Staging:

In field peas and CLEARFIELD canola varieties. Apply up to the 4 leaf stage, unless otherwise indicated:

Chickweed
Cleavers
Green foxtail
Hemp-nettle*
Lamb's-quarters†
Redroot pigweed
Shepherd's purse*
Smartweed
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Volunteer barley**
Volunteer wheat**
Wild buckwheat
Wild mustard
Wild oats (2 to 4 leaf stage)

In seedling and established alfalfa:

Common groundsel†***
Green foxtail†
Green smartweed***
Lamb's quarters†***
Redroot pigweed
Shepherd's purse†***
Stinkweed
Volunteer canola (not CLEARFIELD varieties)
Wild mustard

In dry beans:

Hairy nightshade (up to 6 leaf stage)

* In field peas only.
** Suppression in CLEARFIELD canola only.
*** Seedling alfalfa only
† Suppression.

Cost (2002 suggested retail price):

$22.40/acre.

Rates:

Apply 85 mL per acre. A non-ionic surfactant (Agral 90, Agsurf, Surf 92) should be added at a rate of 0.25 L per 100 L of spray solution. Do not over apply Pursuit, as crop injury may result. Only one application may be made during the growing season.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 to 40 gallons/acre (45 to 180 L/acre).
Pressure: 40 psi (275 kPa).
Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Plants are under stress when conditions before or after application are very hot or cold, excessively dry or wet. During periods of stress, plants are not actively growing and reduced weed control or crop injury may result.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Note: To check for tank mixes see the blue fold out chart inside the back cover.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or harvest seedling alfalfa within 14 days of treatment. Do not graze other treated crops or cut for feed prior to crop maturity. Do not graze or harvest field peas for feed within 30 days.

Preharvest Interval: Do not apply within 60 days of harvesting field peas or chickling vetch, within 70 days of harvesting CLEARFIELD canola, or within 75 days of harvesting dry beans.

Recropping: Rotate to barley, spring wheat (not durum), lentils, alfalfa, field peas or CLEARFIELD canola the year following application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crop other than those listed above. However, yield losses within the test strips may not be noticed unless the yield can be compared to an untreated area seeded adjacent to the Pursuit-treated strip. In case of crop failure, only field peas or CLEARFIELD canola may be replanted in the year of application.

Aerial application: Do not apply by air.

Storage: Do not freeze. If the product is exposed to temperatures below 0°C, thaw the product completely and shake the container vigorously prior to use.

Environment: Do not apply within 15 m of shelterbelts, water bodies, wetlands, and woodlots.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Keep out of reach of children.

Pursuit Ultra

Herbicide Group – 2

(Refer to page 27)

Company:

BASF Canada

Formulation:

Poast Ultra: 450 g/L sethoxydim formulated as an emulsifiable concentrate.

Pursuit: 240g/L imazethapyr formulated as a liquid.

Merge: 2 x 8.1 L jugs

Container size - Jugs are split internally and contain both Poast Ultra and Pursuit. Each split jug treats 40 acres.

Crops and Staging:

CLEARFIELD canola - after the 1 leaf stage.

Field pea - up to the 6th above ground node stage (six true leaves).

Do NOT use in the brown or dark brown soil zones as rotational crops may be severely injured due to carryover in these soils.

Weeds and Staging:

Grasses at the 1 to 6 leaf stage:

Barnyard grass Volunteer barley
Green and yellow foxtail Volunteer corn
Quack grass* Volunteer wheat
Persian darnel Witchgrass
Proso millet Wild oat

Broadleaf weeds up to the 4 leaf stage:

Chickweed
Cleavers
Hemp nettle (peas only)
Redroot pigweed**
Smartweed
Stinkweed
Volunteer canola (non-CLEARFIELD varieties)
Wild buckwheat**
Wild mustard

* Suppression
** Light infestations only

Rates:

Poast Ultra - 0.19 L/acre;

Pursuit - 0.04 L/acre

(One split jug treats 40 acres).

Add Merge at 0.4 L/acre in a water volume of 10 gal/acre (45 L/acre).

Cost (2002 suggested retail price):

$26.07/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre)

Pressure: 40 psi (275 kPa)

Nozzles: Stainless Steel 80° or 110° flat fan nozzles tilted forward at a 45° angle.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Reduced weed control may result if applied when weeds are stressed by hot, cold, dry or wet conditions. Control of grass weeds may be reduced if temperatures are below 15°C.

Tank Mixes:

Herbicides: None.

Fertilizers: None.

Insecticides: None.

Fungicides: None.

Restrictions:

Rainfall: Within one hour of applying Poast Ultra may reduce grass weed control. No rainfast period specified for Pursuit, required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated area prior to maturity.

Preharvest Interval: Between application and harvest leave 60 days for field pea and 70 days for canola.

Recropping Interval: Rotate to barley, spring wheat (not durum), lentils, alfalfa, field peas or CLEARFIELD canola the year following application. The company recommends that a field bioassay (a test strip grown to maturity) be conducted the year before growing any crop other than those listed above. However, yield losses within the test strips may not be noticed unless compared to the yield of an adjacent strip not treated with Pursuit. In case of crop failure, only field peas or CLEARFIELD canola may be re-planted in the year of application.

Aerial Application: Do not apply by air.

Storage: Maybe stored at freezing temperatures. Warm to room temperature and agitate before use.

Environment: Do not apply within 15 m of shelterbelts, water bodies, wetlands and woodlots.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Poast

Caution Poison.

Pursuit

Keep out of reach of children

Refine Extra Toss-N-Go

Herbicide Group – 2
(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

50 percent thifensulfuron methyl plus 25 percent tribenuron methyl formulated as a dry flowable. Container size - 4 water soluble bags (80 g each, total 320 g).

Crops and Staging:

Apply from 2 leaf to the flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions

Cereals:

Barley
Oats
Wheat (including durum, spring and winter)

Seedling or established forage grasses for forage or seed production:*

Bromegrass (meadow, smooth)
Creeping red fescue
Kentucky bluegrass**
Orchardgrass
Tall fescue
Wheatgrass (crested, intermediate, northern, pubescent, slender, streambank, tall, western)

*Since the use of this product on forage grasses is registered under a User Requested Minor Use application, the manufacturer assumes no responsibility for herbicide performance. *Users of this product on forage grass do so at their own risk.*

** Established stands only.

Weeds and Staging:

Unless otherwise noted below, apply to young and actively growing weeds that are less than 4 inches (10 cm) in height or width.

Weeds Controlled:

Annual smartweed (green smartweed, lady's-thumb)
Ball mustard
Chickweed (1 to 6 leaf)
Common groundsel
Corn spurry
Cow cockle
Flixweed
Hemp-nettle
Kochia
Lamb's-quarters
Wild mustard
Russian thistle
Shepherd's-purse
Stinkweed
Tartary buckwheat
Volunteer canola (CLEARFIELD varieties with 2,4-D or MCPA mixes only)
Volunteer sunflowers
Wild buckwheat (1 to 3 leaf)
Narrow-leaf hawk's-beard
Redroot pigweed

Weeds Suppressed:

Canada thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Cleavers (1 to 3 whorls)
Round-leaf mallow (2 to 6 leaf)
Scentless chamomile
Sow-thistle (less than 6 inches (15 cm) tall or across and prior to budding)
Stork's-bill (2 to 6 leaves)
Toadflax (less than 6 inches or 15 cm tall)

Unless otherwise specified, weeds should be less than 4 inches (10 cm) tall or across.

Cost (2002 suggested retail price):

$5.92/acre.

Rate:

8 g/acre (one container treats 40 acres). Add Agral 90, Agsurf, or Citowett Plus at 0.2 L per 100 L of spray solution.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 5 to 10 gallons/acre (22 - 45 L/acre).

Pressure: 30 to 40 psi (210 to 275 kPa).

Nozzles: Flat fan nozzles with 50 mesh line strainers and screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply to wheat, barley or oats that are stressed by severe weather conditions (frost, drought or water saturated soil) as crop injury may result.

Under certain conditions (heavy rainfall, prolonged cool weather, frost conditions, wide fluctuations in day/night temperatures) lightening in crop colour and reduction in crop height may occur.

Kochia control may be reduced during stress conditions or if extremely heavy infestations exist.

Tank Mixes:

Do not mix with substances that contain boron or that release chlorine.

Tank mix Partner	CROPS			
	spring wheat	**durum wheat**	**barley**	**oats**
2,4-D amine or ester (0.34 to 0.45 L/acre)*	✓	✓	✓	
Accord (55 to 67 g/acre) plus Merge (1% v/v)	✓	✓		
Accord (55 to 67 g/acre) + Avenge (1.42 L/acre) plus Merge (1% v/v)	✓	✓		
Assert (0.53 to 0.65 L/acre)	✓	✓	✓	
Assert (0.53 to 0.65 L/acre) + MCPA ester (0.28 to 0.45 L/acre)*	✓	✓	✓	
Curtail (0.61 L/acre) plus surfactant	✓		✓	
Everest (17.4 g/acre) + 2,4-D ester (0.35 to 0.45 L/acre)* plus surfactant	✓			
Horizon (0.095 to 0.117 L/acre) + Score	✓	✓		
Horizon (0.095 to 0.117 L/acre) + MCPA ester (0.34 to 0.45 L/acre)* + Score	✓	✓		
Lontrel (0.085) + Surfactant	✓		✓	
Lontrel (0.085) + 2,4-D or MCPA ester (0.34 L/acre)* + Surfactant	✓		✓	
MCPA amine or ester (0.34 to 0.45 L/acre)* plus surfactant	✓	✓	✓	✓

* 500 g/L formulations

Check the above tank mix partner(s) respective labels for additional staging and varietal restrictions.

Fertilizers: None registered. Do not mix soluble bags with liquid fertilizers.

Note: The above mixes are those listed on the Refine Extra label only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 hours may reduce control.

Grazing: Must not be grazed or fed to livestock for 7 days after treatment.

Recropping: None the year after treatment. Canola, flax, lentils and alfalfa may be planted 2 months after an application of Refine Extra.

Aerial Application: Do not apply by air.

Storage: Store in a cool, dry place. May be frozen.

Tank Cleaning:

Refine Extra can cause severe injury to sensitive crops at very low concentrations. Sprayers used to spray Refine Extra should be flushed out immediately after Refine Extra is used. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia rinse (1L of 3 percent ammonia per 100 L of water). All nozzles, screens and filters should be removed and cleaned after applying this product.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

Warning - Eye and Skin Irritant

Reflex

Herbicide Group – 14
(Refer to page 27)

Company:

Syngenta

Formulation:

Each jug of Reflex contains 240 g/L fomesafen formulated as a solution. Container size- 10L.

Crops and Staging:

Dry beans in the 1 to 2 trifoliate leaf stage.

Weeds and Staging:

Broadleaf weeds controlled by Basagran at the 0.7 L/acre rate plus improved control of the following weeds up to the 4-leaf stage:

Cocklebur
Eastern black nightshade
Lady's thumb
Lamb's-quarters
Ragweed (common)
Redroot pigweed
Wild mustard

Cost (2002 suggested retail prices):

$7.04/acre, not including cost of Basagran or adjuvant.

Rate:

Reflex is registered for application as a tank mix at a rate of 0.23 L/acre Reflex plus 0.7 L/ac Basagran plus adjuvant in the Red River Valley of Manitoba (see maps attached).

Application Information:

Water Volume: 18 gallons/acre (80 L/acre). Increase water volume to 30 gallons/acre (140 L/acre) for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.

Pressure: 275 kPa (40 psi). Increase pressure to 420 kPa (60 psi) for fields with heavy weed densities or with weeds at the upper limit of their recommended stage.

Nozzles: Use nozzles capable of delivering appropriate pressures and volumes.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Weed control and crop tolerance may be reduced under certain stress conditions such as cold temperatures, excess moisture, drought and injury from hail or previous herbicide applications.

Tank Mixes:

Herbicides: Reflex is only registered for use in a Basagran tank mix.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Reflex is unaffected by rain falling 4 hours after application.

Grazing: Do not graze treated crop or cut for hay: there is insufficient data to support such use.

Pre-harvest: Do not apply within 84 days of harvest.

Recropping: Winter wheat maybe sown 4 months after application. Spring wheat, dry beans and field corn may be grown the year following an application.

Do not apply Reflex to any field more often than once every two years.

These recropping restrictions only to the Red River Valley of Manitoba. Use outside this is region is not registered as recropping options have not been determined.

Aerial Application: Do not apply by air.

Storage: No information on label.

Environment: Leave a buffer zone of at least 15 m between the last spray swath and the edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrublands as well as aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Warning- skin and eye irritant; potential skin sensitizer

Reglone Desiccant

Herbicide Group – 22
(Refer to page 27)

Company:

Syngenta

Formulation:

Reglone Desiccant - 240 g/L diquat formulated as a solution with no adjuvant. Container size - 10 L.

Crops and Staging:

Add 0.1 L of Agral 90 or Agsurf per 100 L of spray solution for all applications.

CROP	STAGE	RATE (L/ACRE)	
		Ground	Aerial
Dry beans, soybeans	Crop has lost 80 to 90 per-cent of leaves and 80 percent of pods are yellow.	0.5 to 0.7 (use high rate for dense crop, heavy weed infestations)	0.7 to 0.9 (use high rate for dense crop, heavy weed infestations)
Flax, Solin	75 percent of bolls brown.		
Lentils	Lowest pods are light brown and rattle when shaken.		
Mustard	75 percent of seed has turned brown		
Canola*	60 to 75 percent of seed has turned brown.		
Peas	Bottom pods are ripe and dry, seeds detached from pods.		
Chickpeas	Plants yellow, pods mature, seeds changed colour and detached from pods.		
Sunflowers	Backs of sunflower heads and bracts are turning yellow and seed moisture is 20 to 50 percent.		
Potatoes (some top growth and/or) some weeds)	Two weeks prior to harvest	0.7 to 0.9**	2 applications required. First application – 0.7 to 0.9 L/acre**. Second application (4 to 5 days later) at 0.5 L/acre
Potatoes (dense crop, heavy weed infestations)		1.4**	
Alfalfa, bird's -foot trefoil, red and white clover (for seed production only).***	Pods are ripe but before shattering. Harvest within 7 days.	0.7 to 1.1 (use high rates for dense crops, heavy weed infestations)	0.7 to 1.1 (use high rates for dense crops, heavy weed infestations)

* This product can cause shattering in canola. Use only if crop is severely lodged

** Use high rate for dense or immature vines.

*** Do not use on forage legumes that have been treated with a residual herbicide in the previous 12 months.

Cost (2002 suggested retail prices):

$21.15/L plus surfactant.

Application Information:

Water Volumes:

Ground applications - 20 to 50 gallons/acre (90 to 225 L/acre). Use 50 to 100 gallons/ acre (225 to 455 L/acre) on potatoes.

Aerial applications - minimum of 4 gallons/acre (18 L/acre). Use the highest water volumes when crop canopy is heavy or if weed growth is dense.

Pressure:

Ground application - 30 to 40 psi (200 to 275 kPa).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Best results under cloudy conditions or in evening.

Shattering losses can increase if heavy winds, rain or hail occur after the crop has dried down.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Fungicides: Fungicides may be added when applying Reglone to potatoes for vine killing.

Restrictions:

Rainfall: Within 15 minutes may reduce effectiveness.

Grazing: Crop residues remaining after harvest may be fed to livestock.

Aerial Application: May be applied by air in a minimum of 4 gallons/acre (18 L/acre) water volume.

Recropping: No restrictions the year after application.

Storage: Do not freeze.

Environment: Do not apply by air where wetlands or other good wildlife cover are present. Leave a 15 m border around the edges of sloughs and other wildlife cover.

Tank Cleaning:

When finished spraying Reglone, rinse the sprayer out with clean water. Run through pump, lines and nozzles. Drain tank by spraying out on an untreated portion of a crop on which the product is registered, or by spraying on uncropped land. Refill sprayer with water and Agral 90, Agsurf at 0.6 L per 1,000 L spray solution. Run the solution through lines and boom. Spray out, then refill with clean water. Leave equipment standing overnight, then drain water out.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

◈ Warning Poison

Danger Eye Irritant

Warning Skin Irritant

Remedy EC

Herbicide Group – 4
(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

480 g/L of triclopyr acid formulated as an emulsifiable concentrate. Container size - 2 X 10 L jugs

Crops and Staging:

Pastures and Rangeland. Staging is based on weed stage.

Weeds and Staging:

For best results, apply to the following weeds when leaves are fully expanded and plants are actively growing, until first signs of autumn coloration. Single stem applications should not be used on woody species greater than 8 ft. (2.5 m) tall.

Woody plants controlled:

Alder
Ash
Aspen
Basswood
Beech
Birch
Blackberry
Buckthorn
Cherry*
Chokecherry*
Cottonwood
Dogwood
Elderberry
Elm*
Hawthorn
Maples
Oaks*
Poison oak
Pines*
Poplar
Red maple*
Raspberry*
Sumac
Tamarack
Wild rose
Willow

*These species may require treatment at the higher rate and may need to be retreated the following year, particularly if the original treatment was made at the lower rate.

Non-woody annual and perennial broadleaved weeds controlled are:

Burdock
Chicory
Curled dock
Dandelion
Field bindweed
Lamb's-quarters
Ragweed
Smartweed spp.
Smooth bedstraw
Vetch
Wild lettuce

Cost (2002 suggested retail price):

$28.00/L.

Rate:

Ground Application:

Broadcast foliar: Woody species: 1.6 to 3.2 L/acre, Non-woody species: 0.4 to 1.62 L/acre

Single stem: mix 4-8 litres of Remedy in enough water to make 1000 litres of spray solution

Backpack (low volume foliar): 1-5 litres of Remedy in enough water to make 100 litres of spray solution.

Aerial application: 1.6 to 3.2 L/acre

Application Information:

Water Volume:

Broadcast foliar: minimum 200 L/ha. Proper coverage is important for effective control. Even, uniform coverage, without gaps or pooling of droplets is preferred.

Single stem: apply to the point of runoff.

Backpack (low volume foliar): thoroughly wet foliage but not to runoff

Larger Woody Species: For control of woody species larger than 8 ft. (2.5 m) the basal bark method of control is used where small amounts of Remedy mixed in oil carrier (diesel, fuel oil, kerosene, mineral oil or vegetable oil) is applied directly to the bark of the trunk. Several methods can be used. See the label for directions on this use.

Aerial application: A minimum of 2.7 gal/acre (12 L/acre)

Pressure: Broadcast foliar: maximum 275 kPa (40 psi).

Nozzles: Use application equipment that provides even coverage of large droplets that are not prone to drift.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Avoid spraying if temperatures exceed 28°C.

Tank Mixes:

None registered.

Restrictions:

Rainfall: No rainfree period is specified on the label; required interval may be up to 8 hours. Contact the manufacturer for more information.

Grazing:

For lactating dairy animals:

Rates below 1.9 L/acre - treated areas may be grazed or harvested for greenfeed 14 days after treatment.

Label rates greater than 1.9 L/acre - restrict grazing or greenfeed for 60 days following treatment. Do not harvest treated area for hay for 60 days after treatment.

For other livestock:

Rates below 1.9 L/acre - There is no restriction on grazing or harvesting treated areas for greenfeed but do not harvest treated areas for hay for 7 days after treatment.

Label rates greater than 1.9 L/acre - restrict grazing and harvest for greenfeed or hay for 14 days following treatment.

If less than 25% of grazed area is treated, there is no grazing restriction for other livestock.

Aerial Application: May be applied by air.

Storage: Do not freeze.

Environment: This product is highly toxic to fish, aquatic crustaceans, and plants. Do not apply to water. Do not spray at the edge of wetlands, lakes, ponds, streams, rivers, and wetland wildlife habitats.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison.

Reward

Herbicide Group – 22

(Refer to page 27)

Company:

Syngenta

Formulation:

Reward - 240 g/L diquat formulated as a solution. Container sizes - 4 x 3.78L.

Use:

Control of water weeds such as coontail, duckweed, Canada water weed, pond weeds, and water milfoil in farm dugouts. Offers temporary control of certain species of algae.

Cost (2002 suggested retail prices):

$42.88/L .

Timing:

Mid-May through late June.

Rates:

Dugouts less than 5 feet (1.5 m): Apply Reward at 7.4 L/acre.

At this rate, 2.2 L of Reward will treat a dugout that is 160 feet by 80 feet (49 m x 24.4 m).

Dugouts more than 5 feet (1.5 m): Apply Reward 10 to 11.8 L/acre.

At these rates, a dugout that is 160 feet by 80 feet (49 m x 24.4 m) will require 3.0 to 3.5 L of Reward.

Application:

Dilute 1 part Reward with 4 parts clean water.

Spray over the water surface.

How it Works:

Refer to Table 2 on page 29.

Restrictions:

Grazing: Do not use water for animal consumption for 24 hours after application.

Irrigation: Do not use water for irrigation for 5 days after application.

Domestic Use: Do not use water for human consumption for 24 hours after application.

Storage: Do not freeze.

Environment: If weed growth is dense, protect fish by not treating more than one-fourth of dugout at a time.

Equipment Clean Out:

Refer to page 14.

Hazard Rating:

◈ Warning Poison

Danger Eye Irritant

Warning Skin Irritant

Roundup Transorb/Roundup Original/Roundup Dry

See Glyphosate section on page 120

Rustler

Herbicide Group – 4, 9
(Refer to page 27)

Company:

Monsanto Canada Inc.

Formulation:

132 g/L glyphosate present as the isopropylamine salt.

60 g/L dicamba present as a solution.

Container sizes - 10 L, 115 L.

Crops and Staging:

Summerfallow.

Preseeding in spring on fields to be sown to wheat, barley, oats and rye.

May also be applied prior to sowing field corn in fields with more than 2.5 percent organic matter (do not use on sandy or sandy loam soils).

Rustler **SHOULD NOT** be applied prior to broadleaf crops such as lentils, peas, canola and flax due to the risk of injury.

Weeds, Rates and Staging:

Application should be made to emerged, actively growing weeds. Application at early growth stages generally provides the best results.

Annual grasses - Apply 1 L/acre between emergence and heading. For wild oat apply at the 1 to 3 leaf stage.

Downy brome
Persian darnel
Green foxtail
Volunteer cereals
Wild oats

Annual broadleaves - Apply 1 L/acre up to 6 inches (15 cm) height. For wild buckwheat control, apply at the 1 to 4 leaf stage.

Cow cockle
Flixweed
Kochia
Lady's-thumb
Lamb's-quarters
Redroot pigweed
Russian thistle
Smartweed
Stinkweed
Volunteer canola*
Wild buckwheat
Wild mustard

* NOT including Roundup Ready varieties.

Foxtail barley suppression - Apply 1.26 L/acre before initiation of the seed head.

Cost (2002 suggested retail price):

$5.99 to $7.55/acre.

Application Information:

Water Volume: Apply 5 to 10 gallons/acre (25 to 45 L/acre) water. Use of the lower water volume will improve control. Avoid the use of extremely hard water (greater than 700 ppm calcium or magnesium or high levels of iron).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Reduced results may occur if application is made to weeds that are drought-stressed, damaged by disease or insects. Poor control under cool, cloudy weather can occur. Dust on foliage can also cause reduction in control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Within 6 hours may reduce weed control. Heavy rainfall within 2 hours of application may require a repeat treatment.

Grazing: Do not graze treated areas or cut for feed.

Recropping: No restrictions in the season following treatment.

Aerial Application: Do not apply by air.

Storage: Store above 5°C.

Equipment: Do not mix, store or apply this product or spray solutions of this product in galvanized steel or unlined steel (except stainless steel) containers or spray tanks.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Danger Corrosive to eyes

May cause irreversible eye damage.

Select

Herbicide Group - 1
(Refer to page 27)

Company:

Bayer CropScience

Formulation:

240 g/L of clethodim formulated as an emulsifiable concentrate. Container size - 3 L.

Crops, Rates and Staging:

Crops are tolerant at all growth stages although maximum rates and preharvest intervals must be observed to prevent excess residue in the grain.

To a maximum rate of 80 mL/acre:
Chickpeas*
Dry beans (black, great northern, navy, pink, pinto, red)

To a maximum rate of 150 mL/acre:
Alfalfa (seedling only)
Canola
Field peas
Flax (including Solin)
Lentils
Mustard (brown, oriental, yellow)
Potatoes
Soybeans
Sunflowers

* Apply up to the 9 node stage (7 inches or 18 cm maximum height).

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

WEED	RATE (mL/ACRE)	ACRES TREATED PER 3 L CONTAINER	STAGE
Barnyard grass, green and yellow foxtail, Persian darnel, Proso millet, Volunteer cereals (barley, canary seed, corn, oat, wheat), Wild oat (light infestations only*)	50**	60	2 to 6 leaf stage. For best results, apply at the 2 to 3 leaf stage.
Moderate to heavy infestations of the above grasses	80	40	
Quackgrass (suppression only)	80	40	2 to 6 leaf stage when 3 to 6 inches (6 to 15 cm) tall. For best results, apply at the 3 to 5 leaf stage.
Quackgrass (season long control)	150***	20	

* The company does not provide guidelines for weed densities under light infestations. When in doubt as to the level of weed infestation, use the higher rate or contact the manufacturer.

** At this rate, Select should not be tank mixed with any other pesticide and should only be applied under the following growing conditions: good crop stand, within the recommended leaf staging (2 to 3 leaf is optimum timing) prior to tillering, light weed infestations, adequate moisture and fertility, absence of stress, and good growing conditions.

*** Apply with 10 L of Amigo per 1000 L of spray solution

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Cost (2002 suggested retail price):
$10.75 to $32.25/acre.

Application Information:

Water Volume: 5 to 10 gallons/acre (25 to 45 L/acre). Use 10 gallons/acre (45 L/acre) under dense weed infestations or dense crop canopies.

Pressure: 40 psi (275 kPa).

Nozzles: Stainless steel 80° flat fan nozzles tilted forward at a 45° angle.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Select will be less effective when plants are stressed by lack of moisture, excessive moisture, low temperature and/or very low relative humidity. Regrowth of tillers may occur if application is made under any of the above stress conditions.

Tank Mixes:

Select may be tank mixed with other pesticides at the 80 to 150 mL/acre rates. Add the recommended amount of Amigo with all tank mixes unless otherwise indicated.

Herbicides:

In Flax (not including Solin):
Buctril M (0.4 L/acre)
MCPA ester (rates for flax).
[1]Lontrel at 0.23 to 0.34 L/acre.

In Solin (low linolenic flax varieties):
Buctril M (0.4 L/acre)

In Canola:
[1]Lontrel at 0.17 to 0.34 L/acre.
[1]Muster at 8 to 12 g/acre (redroot pigweed is controlled at the 8 g/acre rate of Muster in this tankmix).

In Clearfield Canola only:
[1]Pursuit at 40 to 85 mL/acre At the low rate of Pursuit, the following weeds are controlled:
chickweed, hemp-nettle, redroot pigweed* stinkweed, volunteer canola (NOT CLEARFIELD varieties) wild buckwheat*, wild mustard, plus weeds listed on Select label.
*Light infestations only. For heavy infestations, use high rate of Pursuit.

In Liberty Link Canola only:
Liberty at 1.1 to 1.35 L/acre (Select at 25.5 mL/acre may be tank mixed with to enhance control of wild oat and volunteer cereals. When mixing add Amigo adjuvant to the water first, then Liberty, then Select. Consult label for detailed mixing instructions.

In Field peas:
[1]Pursuit at 85 mL/acre.

[1] Apply with the 80 mL/acre rate of Select only.

Allow 4 days between application of Select and any other chemical not recommended as a tank mix combination on the label.

Fertilizer: None registered.

Insecticide: None registered.

Note: The above mixes are those listed on the Select label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. See the general guidelines for mixing pesticides for more information.

Restrictions:

Rainfall: Within 1 hour may reduce control.

Grazing: Do not graze or cut treated crops for forage until 60 days after application of Select to annual crops, and 30 days after application to seedling alfalfa.

Preharvest Interval: Do not apply within 60 days of harvesting canola, dry beans, flax (including Solin), lentils, potatoes, chickpeas (Desi and Kabuli) or mustard (brown, yellow, oriental). Do not apply within 75 days of harvesting soybeans or field peas. Do not apply within 30 days of harvesting seedling alfalfa. Do not apply within 72 days of harvesting sunflowers.

Aerial Application: Do not apply by air.

Storage: May be stored at any temperature.

Other: Do not apply more than 0.15 L/acre to the same land area per season.

Environment: Leave a buffer of 15 meters between the last past of the sprayer and open water, wellheads, wetlands and other non-target areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Skin and Eye Irritant

Sencor

Herbicide Group – 5
(Refer to page 27)

Company:

Bayer CropScience

Formulations:

Sencor Solupak 75 DF - 75 percent metribuzin formulated as a dispersible granule.
Container size - 2.5 kg (5 water soluble bags, 500 g each).

Sencor 500F/Sencor 480F – 50-48 percent metribuzin formulated as a flowable. Container size - 5 L.

Sencor 75 DF - 75 percent metribuzin formulated as a dispersible granule. Container size - 2.5 and 5 kg.

Crops, Rates and Staging:

CROP	APPLICATION TIMING	RATES (kg or L/acre)
Barley	2 to 5 leaf stage.	Sencor 500F/480F - 0.111 to 0.223 Sencor 75DF - 0.08 to 0.152
Spring wheat (including durum)	2 to 5 leaf stage.	Sencor 500F/480F - 0.111 to 0.172 Sencor 75DF - 0.08 to 0.111
Winter wheat (Norstar only)	In late fall after tillers have developed (past the 3 leaf stage).	Sencor 500F/480F - 0.344 to 0.45
Peas (Field and processing*	Preplant incorporated (when tank mixed with Edge DC, Rival or Treflan EC)	**Spring:** Sencor 500F/480F - 0.223 to 0.283 Sencor 75DF - 0.152 to 0.192 **Fall:** Sencor 500F/480F - 0.280 to 0.343 Sencor 75DF - 0.192 to 0.223
Peas (Field only)*	Postemergence - up to 6 inches (15 cm) of vine length. For short-statured, determinate flowering peas, apply at the early stages within this range.	Sencor 500F/480F - 0.172 to 0.223 Sencor 75DF - 0.111 to 0.152
	Split Post-emergent Applications**	First application of: Sencor 500F/480F - 0.08 to 0.11 Sencor 75DF - 0.06 to 0.08 Second application 7 to 10 days later with rates within these ranges.
Lentils*	Single or Split applications** to plants up to 6 inches (15 cm) of vine length. For maximum crop tolerance, apply at the 1 to 4 above ground node stage.	Sencor 500F/480F - 0.172 Sencor 75DF - 0.111
		First split application of: Sencor 500F/480F - 0.08 to 0.11 Sencor 75DF - 0.06 to 0.08 Second split application 7 to 10 days later with rates within these ranges.

CROP	APPLICATION TIMING	RATES (kg or L/acre)
Chickpeas*	Up to 2.5 inches (6 cm) in height, when vines have 1 - 3 above ground nodes. Note application past recommended growth stage may result in severe crop injury.	Sencor 500F/480F - 0.167 Sencor 75 DF - 0.111
Potatoes (except Belleisle or Tobique)	Preplant incorporated (with Eptam).	Sencor 500F/480F - 0.222 to 0.343 Sencor 75DF - 0.152 to 0.223
	Pre-emergence in sprinkler irrigation systems (apply only in a tank mix with Eptam 8-E)	Sencor 500F/480F - 0.222 to 0.343 Sencor 75DF - 0.152 to 0.223
Potatoes (except Atlantic, Belleisle, Eramosa, Tobique and red-skinned or early maturing varieties)	Early postemergence (up to 4 inches or 10 cm in height).	Sencor 500F/480F - 0.222 Sencor 75DF - 0.151
Soybeans (KG20 and McCall only)	Preplant incorporated (tank mixed with Treflan EC).	Sencor 500F/480F - 0.172 to 0.343 Sencor 75DF - 0.111 to 0.223
Fababeans	Preplant incorporated (tank mixed with Treflan EC or Edge DC).	**Spring:** Sencor 500F/480F - 0.172 to 0.343 Sencor 75DF - 0.111 to 0.223 **Fall:** Sencor 500F/480F - 0.280 to 0.343 Sencor 75DF - 0.190 to 0.223

* DO NOT use on lentils, peas or chickpeas seeded less than 2 inches (5 cm) deep or in soils with less than 4 percent organic matter.

**Under certain field or weather conditions a split application may provide better weed control and crop tolerance than single applications. The first application should be made at the cotyledon to 2 leaf stage of the weeds. The second application should be made when a second flush of weeds have emerged or if weeds which were more advanced at the time of the first application have started to show regrowth. The split applications are normally 7 to 10 days apart.

Note: When Sencor is tank mixed with Edge or Treflan in peas, fababeans, and soybeans, refer to product label for maximum rates that can be applied on light textured soils.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Post-emergence Sencor 75 DF at 81 g/acre or Sencor 500F 121mL/acre:

Weeds controlled in spring wheat, barley, field pea and suppressed in lentil and chickpea:

Chickweed
Green smartweed
Hemp-nettle*
Lamb's quarters
Stinkweed
Volunteer canola
Wild mustard

Additional weeds controlled in spring wheat and barley only:

lady's-thumb
redroot pigweed

Postemergence with Sencor 75 DF at 111 g/acre or Sencor 500F at 166 mL/acre:

Weeds controlled in spring wheat, barley, potato, field pea, and suppressed in lentil and chickpea:

Weeds above plus:
Ball mustard
Corn spurry
Hemp-nettle
Tartary buckwheat

Additional weeds controlled in spring wheat and barley only:

Common Groundsel
Night-flowering catchfly
Wormseed mustard

Post Emergence with Sencor 75 DF at 152 g/acre or Sencor 500F at 222 mL/acre in spring wheat and barley only:

Weeds above plus:
Henbit
Russian thistle

Post Emergence with Sencor 75 DF at 152 g/acre or Sencor 500F at 222 mL/acre in potatoes only:
Weeds listed for peas above plus:

Lady's-thumb
Redroot pigweed
Shepherd's-purse

Post Emergence in Winter Wheat with Sencor 500F at 344 to 450 mL/acre in winter wheat controls:

Downy brome
Flixweed Stinkweed
Shepherd's-purse

Preplan Incorporated in Fababeans, Lentils, Field Pea, Soybean:
Must be applied in tank mix with Treflan EC or Rival DF):

Chickweed
Corn spurry
Green smartweed
Hemp-nettle
Lamb's quarters
Stinkweed
Volunteer canola
Wild mustard ***

Plus weeds controlled by either Rival DF or Treflan EC.

* Use the high rate for best control.

** Suppressed only in lentils and chickpeas.

Weed Stage:

Pre-emergence.

Postemergence applications should be made when weeds are small - 2 inches (5 cm) in height or diameter.

Split applications (postemergence on lentils and peas) - 1st application at cotyledon to 2 leaf stage of weeds. 2nd application (if necessary) 7 to 10 days after the first.

Cost (2002 suggested retail price):

Sencor 75 DF & Sencor Solupak 75 DF - $70.25/kg

Sencor 500F/Sencor 480F - $43.06/L

Application Information:

Water Volume:

Preplant incorporated - 10 gallons/acre (45 L/acre). *Postemergence applications* - Cereals - 10 gallons/acre (45 L/acre). Lentils, peas, chickpeas - 15 gallons/acre (70 L/acre).

Pressure: 30 to 40 psi (200 - 275 kPa).

Nozzles: Flat fan nozzles with opening no smaller than 8002 or TK2 with 50 mesh screens. For lentils, peas and chickpeas use nozzles no smaller than 8003 or TK3. Angle nozzles 45° forward.

Incorporation: All plant growth and stubble should be thoroughly worked into the soil before treatment. Apply directly to the soil surface. Two incorporations are required at right angles for thorough mixing. The first incorporation must be made within 24 hours of spraying. For fall applications, it is preferred that both incorporations be done in the fall. The second incorporation may be delayed until spring to conserve trash; however, both incorporations must be done the recommended depth.

Incorporate with a tandem disc, discer or field cultivator (Vibrashank type). Set equipment to work at a depth of 3 to 4 inches (8 to 10 cm). Operate disc implements at 4 to 6 mph (7 to 10 km/hr), cultivators at 6 to 8 mph (10 to 13 km/hr).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions

Crop height reductions or yellowing may occur if high temperatures occur within 48 hours of application. Cold, cloudy weather or frost within 3 days of application will also aggravate injury. If frost occurs, allow 4 to 5 days for crop to recover prior to applying Sencor. Heavy rainfall soon after application to peas, lentils and chickpeas can result in stand reduction on soils with less than 4 percent organic matter.

Tank Mixes:

Herbicides:

In spring wheat or barley:
Banvel II, Target, MCPA amine or 2,4-D amine.

In potatoes (preplant incorporated):
Eptam 8-E (Required).

In fababeans (preplant incorporated):
Treflan EC (Required).

In soybeans (preplant incorporated):
Treflan EC (Required).

In peas:
Treflan (PPI)
Rival (PPI).
Sencor 500F/480F at 0.113 L/acre or Sencor 75 DF at 0.077 kg/acre plus 0.19 L/acre MCPA sodium salt (300 g/L).

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Sencor label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Allow 5 days between application of Sencor and application of other pesticides.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 6 hours may reduce control.

Grazing: Do not graze treated cereal crops within 30 days of application, or peas and lentils within 70 days of application.

Preharvest Interval: Do not harvest barley, wheat or potatoes within 60 days of application. Do not harvest lentils, chickpeas, or field peas within 70 days of application. Do not harvest processing peas within 40 days of application.

Recropping: Preplant incorporated treatments may leave a residue in the soil that will affect succeeding crops when using higher rates of product. Do not seed canola, sunflowers, onions, celery, peppers, cole crops, lettuce, spinach, red beets, turnips, pumpkin, squash, cucumbers or melons the year after treatment. Fall seeded crops may be injured when seeded the same year as preplant or post-emergence applications of these products.

Aerial Application: No restrictions on label. Reduced weed control and increased crop injury can occur with aerial applications.

Storage: May be frozen.

Environment: Avoid drift onto sensitive plants and contamination of water or wetland areas.

Tank Cleaning:

Spray equipment must be thoroughly cleaned to remove traces of herbicide that might injure other crops to be sprayed. Drain any remaining spray solution from the spray tank. Rinse the spray tank and refill with water, adding a heavy-duty detergent at the rate of 0.25 L per 100 L of water. Recycle this mixture through the equipment for 5 minutes and spray out. Repeat this procedure twice. Fill the spray tank with clean water, recycle for 5 minutes, and spray out. Clean pump and nozzle screens thoroughly. Wash away any spray mixture from the outside of the spray tank, nozzles or spray rig.

Do not clean equipment upslope of water bodies or ditches, near cropland or shelterbelts. Clean your sprayer away from areas where family members or others are likely to frequent or walk.

Refer to page 14 for additional information.

Hazard Rating:

Keep out of reach of children.

Simazine

Herbicide Group – 5
(Refer to page 27)

Company:

Syngenta (Princep Nine-T)

United Agri Products (Simadex, Simazine 480)

Formulations:

Princep Nine-T - 90 percent simazine formulated as a water dispersible granular. Container size - 5 kg.

Simadex – 500 g/L simazine formulated as a flowable liquid. Container size – 2 x10L.

Crops and Staging:

Established alfalfa (Princep Nine-T) or bird's-foot trefoil (Princep Nine-T, Simadex)

Do not use in year of seeding. Apply after September 1, but before freeze-up.

Established shelterbelts (elm, caragana, green ash, Manitoba maple). - fall or early spring before weeds begin growth.

Do not apply to frozen ground.

Weeds and Staging:

Simazine is applied prior to the emergence of the weeds and kills them when they are exposed to the treated layer of soil.

- Barnyard grass
- Lamb's-quarters
- Lady's-thumb
- Perennial species starting from seed
- Purslane
- Ragweed
- Smartweed
- Volunteer clovers
- Wild Buckwheat
- Wild oats
- Yellow foxtail

Cost (2002 suggested retail prices):

Princep Nine-T – $15.40/kg

Simazine liquids - $11.42/L

Rates:

Forage crops:
Princep Nine-T - 0.45 kg/acre.
Simadex – 0.89 L/acre.

Shelterbelts:
Princep Nine-T - 2 to 3 kg/acre,
Simadex – 3.64 to 5.46 L/acre

Application Information:

Water Volume: 30 gallons/acre (135 L/acre). In shelterbelts, use a minimum of 50 gallons/acre (225 L/acre).

Pressure: 30 to 45 psi (200 to 300 kPa).

Nozzles: Flat fan nozzles with 50 mesh or coarser nozzle screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

When applying to forage stands, dry soil conditions at the time of weed emergence may result in reduced weed control.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the simazine labels only. For additional mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Moderate rainfall after application enhances activity.

Grazing: In forage stands, allow 30 days between application and grazing, 60 days between application and cutting for feed.

Recropping: Do not sow treated fields to any crop the year after application.

Aerial Application: Do not apply by air.

Storage: May be frozen. Store in a cool, dry place.

Tank Cleaning:

Refer to page 14.

Spectrum

Herbicide Group – 2,4
(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

Each case of Spectrum will contain 2 jugs:

Spectrum A: 50 g/L florasulam formulated as a suspension concentrate.

Spectrum B: 50 g/L clopyralid and 280 g/L of MCPA ester formulated as an emulsifiable concentrate.

Container size- Spectrum A - 0.8 L, Spectrum B - 12 L.

Crops and Staging:

Spring wheat (including durum), barley and oats in the 2 to 6 leaf stage.

Weeds and Staging:

Broadleaf weeds controlled at the 2 to 4-leaf stage:

Canada thistle
Chickweed
Cleavers
Flixweed*
Hemp-nettle
Lamb's-quarters
Redroot pigweed
Shepherd's-purse
Smartweed
Sow-thistle (annual)
Stinkweed
Stork's-bill
Volunteer canola
(all varieties)
Wild mustard
Wild buckwheat

Broadleaf weeds suppressed:

Dandelion**
Sow thistle (perennial)

*spring seedlings only
**seedlings and overwintered rosettes

Cost (2002 suggested retail price):

$13.40/acre.

Rate:

Spectrum A: 0.04 L (40 mL)/acre

Spectrum B: 0.6 L /acre

One case treats 20 acres.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13 of the Guide to Crop Protection.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Use nozzles capable of delivering appropriate pressures and volumes.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Warm, moist growing conditions promote active weed growth and enhance activity of Spectrum. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed and regrowth may occur. Under conditions of low crop and high weed density, control may be reduced. Extreme growing conditions such as drought or near freezing temperature prior to, at or following time of application, may increase the risk of crop injury at all stages of growth.

Tank Mixes:

Herbicides:

In spring wheat (including durum) and barley:
Assert at 0.65 L/acre plus Acidulate at 0.25 L per 100 L spray solution.

In spring wheat (including durum) only:
Horizon at 0.095 L (95 mL)/acre or 0.115 L (115mL)/acre plus Score Adjuvant.

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Spectrum label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze treated crop or cut for feed within 7 days of application.

Pre-harvest Interval: Do not apply within 60 days of harvest.

Recropping: Wheat, barley and canola may be grown the year following an application:

Aerial Application: Do not apply by air.

Storage: Store in dry, heated area. If frozen, bring to room temperature and agitate before use.

Environment: Leave a buffer zone of at least 30 m between the downwind edge of the boom and the closest edge of sensitive terrestrial areas such as shelterbelts, hedgerows and shrublands. A buffer zone of at least 5 m is required between the downwind edge of the boom and the closest edge of aquatic areas such as ponds, streams, rivers, prairie potholes and sloughs.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

▽ Caution Poison

May cause eye irritation

Stampede EDF

Herbicide Group - 7
(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

80 percent propanil formulated as an extruded dry flowable. Container size - 10 kg.

Crops and Staging:

Barley, oats, spring wheat (including durum) at the 2 to 5 leaf stage. Best crop tolerance at the 3 to 4 leaf stage.

Canaryseed* and Kentucky bluegrass (seedling and established)* at the 2 to 4 leaf stage.

Flax (NOT Solin varietes) - 2 to 5 inches (5 to 12 cm) in height.

* Seed production only.

Temporary crop injury (yellowing and tip burning) may appear 2 to 5 days after application.

See tank mix section for tank mixing/cropping restrictions.

Weeds and Staging:

Green and yellow foxtail (wild millet) at the 1 to 3 leaf stage and less than 1 inch (2.5 cm) in height plus all broadleaf weeds controlled by tank mix partner (2,4-D or MCPA or Refine Extra). To maximize green foxtail control, Stampede EDF should be tank mixed with one of the registered products.

Stampede is registered for suppression of green foxtail when applied alone.

Cost (2002 suggested retail price):

$9.30/acre (not including cost of tank mix partner).

Rates:

Apply 0.5 kg/acre (one 10 kg container treats 20 acres).

For optimum green foxtail control, Stampede EDF must be tank mixed with a broadleaf product as listed in Tank Mix section.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: For standard ground sprayers, use a minimum of 10 gallons/ acre (45 L/acre) water or reduced control may result. When using floater type equipment with floodjet nozzles, apply in 15 gallons/acre (70 L/acre) water. Ensure that water temperature is at least 10°C. Do not apply with a spray coupe.

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan with 50 mesh or coarser nozzle and filter screens.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

This product can cause crop injury (severe burning, yellowing) under certain environmental conditions.

Do not spray when temperatures are below 15°C or when daytime high temperatures will exceed 30°C as severe crop injury will occur. Do not apply if crop is recovering from frost damage or if frost is expected within 24 hours. Crops damaged by winds should be fully recovered before applying Stampede. Best weed control is obtained when relative humidity is high and daily maximum temperatures range from 21 to 25°C. Poor control can be expected if topsoil is dry to a depth of 2 inches (5 cm) or more.

Tank Mixes:

Herbicides:

Kentucky bluegrass: None registered.

Other crops: See table.

	Crop / Rate			
Tank Mix Partner	**Wheat (not including durum)**	**Durum Wheat**	**Barley, Oats**	**Flax, Canary Seed**
2,4-D Amine 500	0.32 L/acre	0.32 L/acre	Not registered	Not registered
2,4-D Ester 600	0.27 to 0.40 L/acre	0.27 to 0.40 L/acre	Not registered	Not registered
MCPA Amine/Ester	0.32 L/acre	0.23 L/acre	0.23 L/acre	0.23 L/acre
Refine Extra	8 g/acre*	8 g/acre*	8 g/acre*	Not registered

* Add a recommended surfactant such as Agral 90, Agsurf or Citowett Plus.

Allow a 3 day interval before or after application of Stampede EDF and other herbicides.

Do not apply Stampede after a field has been treated with a triazine herbicide (for example, Sencor, Bladex or simazine) unless all of the triazine residues have disappeared.

Fertilizers: None registered.

Insecticides: Decis may be applied as a tank mix with Stampede EDF. Allow 14 days between application of Stampede and dimethoate (Cygon) or malathion insecticides. Allow 5 days after applications of Stampede on wheat and 10 days on barley, prior to applying Furadan. Do not spray other insecticides the same season as Stampede. Severe crop injury can result if carbaryl (Sevin) or parathion methyl or Guthion are applied in the same crop year with Stampede.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 4 hours will reduce control.

Grazing: Do not graze treated crops or cut for hay prior to crop maturity.

Recropping: No restrictions the season after Stampede application.

Aerial Application: Do not apply by air.

Storage: Stampede EDF may be frozen.

Environment: This product is toxic to fish. Keep out of streams, ponds and irrigation waters.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Warning Poison

Sundance

Herbicide Group – 2
(Refer to page 27)

Company:

Monsanto Canada Inc.

Formulation:

75 percent sulfosulfuron formulated as a water dispersible granule. Container size – 432g per case.

Adjuvant: Merge – 8 L.

pH adjuster: - 7 percent ammonium hydroxide solution. Container size: 4L jug.

Crop and Staging:

Spring wheat (including Avonlea, Kyle, Morse and Plenty durum) prior to emergence of the 4 th tiller. (Do not underseed forage legumes).

Weeds and Staging:

Green foxtail: emerged but prior to heading.

Wild oat: From emergence to the 6 leaf stage with no more than 3 tillers. For optimum weed control and crop yield, apply prior to tillering.

Annual Broadleaf weeds: cleavers, common chickweed, redroot pigweed, stinkweed, volunteer canola (NOT including CLEARFIELD canola), wild mustard - Apply to the seedling stage for optimum weed control.

Perennial Grass and Broadleaf weeds: dandelion**, Foxtail barley, green foxtail*, perennial sow-thistle**, quack grass* - Prior to heading/flowering when plants are actively growing

* Suppression only

** Spring seedlings are controlled and established plants are suppressed.

Cost (2002 suggested retail price):

$15.50/acre including adjuvant.

Rates:

pH adjuster - add 1 L per 400 L of spray solution.

Sundance - 11g/acre or 40 acres/case

Merge - 0.2 L/acre.

Refer to the product label for complete mixing instructions. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 5 to 10 gallons/acre (23 to 45 L / acre)

Pressure: 40 psi (275 kPa)

Nozzles: Flat fan. Choose nozzles that provide optimum spray distribution and coverage at the appropriate spray pressure. Do not use flood jet or controlled droplet application equipment.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

For optimum results, do not apply to weeds growing under stress.

Tank Mixes:

Herbicides:

2,4-D ester (500 g/L formulation) at 0.340 L/acre for additional control of lamb's-quarters, wild buckwheat, volunteer CLEARFIELD Canola, stork's-bill, dandelion**, narrow-leaf hawk's-beard** , kochia, annual smartweed spp., and perennial sow-thistle**.

Pardner at 0.405 L / acre for additional control of weeds controlled by Pardner plus narrow-leaf hawk's-beard**.

MCPA ester (500 g/L formulation) at 0.385 L/acre for additional control of weeds listed on MCPA ester label plus narrow-leaf hawk's-beard***, wild radish, volunteer sunflower, common plantain, and wild buckwheat*.

Buctril M at 0.405 L/acre for additional control of those weeds listed on the Buctril M label plus dandelion**, hemp-nettle, velvetleaf, Canada thistle* and perennial sow-thistle*.

* Suppression only

** Control of spring seedlings and season-long control of established plants.

*** Spring Seedlings only

Fertilizers: None

Insecticides: None

Note: The above mixes are those listed on the Sundance label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance.

Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Do not apply if rain is forecast during, or soon after, application.

Grazing: Do not graze in the year of treatment.

Pre-harvest interval: No information available on label. Contact manufacturer for information.

Recropping: Wheat (including durum), canola, barley, peas and flax may be grown the year after application. In fields with areas where organic matter content is less than 4 percent and with soil pH greater than 7.0 seed only wheat or CLEARFIELD canola the year following application. Re-seed only to wheat in the year of application.

For all other crops, allow at least 22 months following application and conduct a field bioassay prior to planting.

Aerial Application: Do not apply by air.

Storage: Store under cool, dry conditions (below 50° C) away from foodstuffs, feed or seed.

Environment: Do not apply to water or contaminate water when draining sprayer. Maintain a buffer zone of 30m between the last spray swath and the edge of sensitive areas (shelterbelts, wood lots, or gardens). Leave a buffer zone of 6m between the last spray pass and wetlands or ponds. Use precautions to AVOID DRIFT. Drift may cause soil residues that will injure subsequent crops.

Tank Cleaning:

Do not drain or clean sprayer in an area where wastewater may drain into wells, other water bodies, or surrounding desirable vegetation. Flush tank, boom, and hoses with clean water for a minimum of ten minutes to remove all visible residues of the product. Fill the tank with water and add 1 L of household ammonia (minimum 3% ammonia content) per 100 L of rinse water and agitate. Flush solution through booms and hoses then top up tank with clean water. Agitate for 15 minutes, flush the hoses and booms again and then drain the tank. Remove nozzles and screens and clean separately with the ammonia solution as above. Repeat the ammonia rinse procedure as above. Thoroughly rinse the tank with clean water for at least 5 minutes, flush water through hoses and booms, and drain. Dispose of wash solution by spraying in a waste area or on the treated field.

For additional information, refer to page 14.

Hazard Rating:

Sundance: Slight skin irritant

Merge adjuvant: Warning Poison; skin irritant

pH adjuster: Caution corrosive

Target/Sword

Herbicide Group – 4

(Refer to page 27)

Company:

Syngenta (Target)
United Agri Products (Sword)

Formulation:

275 g/L MCPA, 62.5 g/L mecoprop and 62.5 g/L dicamba formulated as a solution.

Container size - 10 L.

Crops and Staging:

Cereals:

CROP	STAGE
Barley	2 to 4 leaf (3 leaf for best crop safety)
Canaryseed, oats, spring wheat (including durum)	2 to 5 leaf (3 to 4 leaf for best crop safety)
Winter wheat	Spring application only; up to 12 inches (30 cm) high (top leaf extended)
Summerfallow	Fall stubble

Seedling grasses grown for forage only (NOT for seed production)*:

Apply at the 2 to 4 leaf stage.

Creeping red fescue
Crested wheatgrass
Intermediate wheatgrass
Meadow foxtail
Orchardgrass
Smooth bromegrass
Timothy

Established grasses for forage only (NOT for seed production)*:

Apply up to flag leaf stage.

Bromegrass (meadow, smooth)
Fescue (creeping red, meadow, tall)
Kentucky bluegrass
Meadow foxtail
Orchardgrass
Timothy
Wheatgrass (crested, intermediate, pubescent, slender, streambank, tall, western)

* NOTE: Use only one application per year by ground. The data used in granting this registration was developed by groups other than the manufacturer. The manufacturer provides no warranty and holds no liability with respect to weed control or crop tolerance for the use of these products on seedling forage grasses. Users of these products on forage grasses do so at their own risk.

Cost (2002 suggested retail price):

Sword - $12.40/L

Target - $13.00/L

Weeds and Staging:

Weeds controlled at the 2 to 3 leaf stage unless otherwise indicated:

Annual sow-thistle
Ball mustard
Canada thistle (6 to 8 inches (15 to 20 cm) and actively growing)*
Cleavers (1-2 whorls)
Common ragweed
Corn spurry
Cow cockle
Field bindweed*
Flixweed
Green smartweed
Hedge bindweed*
Hemp-nettle (less than 2 pairs of true leaves)
Knotweed
Kochia
Lady's-thumb
Lamb's-quarters
Night- flowering catchfly
Perennial sow-thistle*
Prostrate pigweed
Redroot pigweed
Russian thistle (less than 2 inches (5 cm)
Shepherd's-purse
Stinkweed
Tall mustard
Tartary buckwheat
Volunteer canola
Volunteer sunflowers
Wild buckwheat
Wild mustard
Wormseed mustard
Yellow mustard

* Top Growth Control only

Rate:

0.40 to 0.60 L/acre (one 10 L container treats 25 to 16.7 acres).

Use the higher rate under adverse weather conditions, when weed density is high, for cleavers control, winter annual control and for suppression of Canada thistle and perennial sow-thistle.

Although Target/Sword is registered up to the 5 leaf stage of the crop for the rates listed here, the low rate should be used when the crop is at the 5 leaf stage for optimum crop safety.

For Canada thistle, post-harvest or summerfallow application, use 0.81 L/acre (one 10 L container treats 12.4 acres).

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 45 psi (200 to 300 kPa).

Nozzles: Flat fan with 50 mesh screens and filters.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Hot and dry or cold and wet weather prior to spraying may result in reduced weed control and increased crop injury.

Do not apply within 2 weeks of a killing frost.

Tank Mixes:

Herbicides:

Spring wheat (including durum): Horizon.

Wheat and Barley: Sencor or linuron for chickweed control.

Fertilizers: None registered.

Insecticides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Activity may be reduced if rainfall occurs within 3 hours of application. Contact manufacturer for more information.

Grazing: Do not graze or harvest for livestock feed within 7 days of application.

Preharvest Interval: Do not apply within 80 days of harvest.

Recropping: No restrictions the year after application.

Aerial Application: Target/Sword may be applied by air with a minimum of 3 gallons/acre (12 L/acre) water.

Storage: Do not freeze.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Caution Poison

Thumper

Herbicide Group – 4, 6

(Refer to page 27)

Company:

Bayer CropScience

Formulation:

280 g/L bromoxynil and 280 g/L 2,4 D ester formulated as an emulsifiable concentrate. Container size - 8 L.

Crops and Staging:

Spring wheat (including durum) and barley at the 4 leaf to flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled at the 1 to 4 leaf stage:

American nightshade
Ball mustard
Bluebur
Cocklebur
Common ragweed
Cow cockle
Flixweed
Green smartweed
Lady's-thumb
Night-flowering catchfly
Pale smartweed
Redroot pigweed
Shepherd's-purse
Volunteer canola
Volunteer sunflower

Weeds controlled at the 1 to 8 leaf stage:

Common groundsel
Lamb's-quarters
Stinkweed
Tame buckwheat
Tartary buckwheat
Wild buckwheat
Wild mustard

Weeds Controlled from 1 to 12 leaf (max. 2 in. tall):

Kochia
Russian thistle

Rates:

0.405 L/acre (one 8 L container treats 20 acres).

Cost (2002 suggested retail price):

$6.33/acre.

Application Information:

Water Volume: 5 - 10 gallons/acre (22 - 45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° flat fan nozzles. All strainer and nozzle screens must be 50 mesh or coarser.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Less than acceptable weed control may be expected if weeds are under stress because of excessive moisture, drought, or cool weather.

Tank Mixes:

Herbicides:

In spring wheat (including durum) and barley:

Achieve 80 DG (0.1 kg/acre)
Avenge (1.4 to 1.7 L/acre)
Puma^{120} Super (0.15 to 0.31 L/acre)

In spring wheat (including durum) only:

Horizon (95 mL/acre) plus Score

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Thumper label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not graze or cut for livestock feed within 30 days of application. Withdraw meat animals 3 days before slaughter.

Preharvest Interval: Do not harvest within 30 days of application.

Recropping: No recropping restrictions the year after application.

Aerial Application: May be applied by air in 3 to 4 gallons/ acre (12 to 16 L/acre) water. Use the higher volume when there is a heavy crop canopy, or when the majority of weeds are cow cockle, smartweed, or pigweed.

Storage: May be frozen.

Environment: Apply when wind is blowing lightly away from non-target areas and water bodies or wetland areas.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

◈ Warning Poison

Eye Irritant

Tordon 22K

Herbicide Group - 4
(Refer to page 27)

Company:

Dow AgroSciences

Formulation:

240 g/L picloram acid present as a potassium salt, formulated as a solution.

Container size - 2 X 10 L jugs

Crop and Staging:

Apply at any stage of permanent grass pastures, rangeland and non-cropland.

Weeds, Rates and Staging:

For the control of biennial and deep-rooted perennial weeds listed below:

Weed	Rate L/Acre	mL per 100 m²*
Scentless chamomile	0.445	11
Knapweed (diffuse, spotted)	0.910	22
Canada thistle, pasture sage, poverty weed, Russian knapweed, perennial sow-thistle	1.8	45
Leafy spurge, field bindweed, toadflax	3.6	90

* mix with 18 litres of water and apply 18 litres of spray solution per 100 square metres.

For best results, applications should be made when perennial weeds have fully developed, green leaves. Application in late summer (or periods of dry weather) when plants are not actively growing may result in unsatisfactory control.

Cost (2002 suggested retail price):

$39.75/L

Only available through Dow AgroSciences trained agents. Contact Dow AgroSciences for further information.

Application Information:

Water Volume: 35 to 70 gallons/acre (160 - 324 L/acre)

Pressure: 20 to 50 psi (150 to 350 kPa).

Nozzles: Flat fan recommended. Non-target broadleaf plants are very sensitive to picloram drift.

Avoid conditions that are conducive to drift. (See page 12 for drift control suggestions)tions)

How it Works:

Picloram interferes with cell division, causing leaf cupping, stem distortion and eventual death. Picloram is absorbed through the leaves and roots.

IMPORTANT: Picloram is a very persistent and water-soluble herbicide. Treated soil should not be moved from the treated area. Do not apply to soils that are permeable, have sinkholes, or lie over limestone bedrock. Do not apply to soils whose surfaces are composed of fractured rock or unconsolidated gravel. Application to these sites may allow the movement of herbicide to underlying water sources or aquifers. When applying Tordon 22K

over sandy soils ensure that aquifers are not within 1.8 m of the soil surface. If shallow aquifers are present, do not apply Tordon 22K.

Tordon 22K must not be applied on range and pasture acres that are irrigated. Do no compost or mulch clippings from grass treated with Tordon 22K.

Effects of Growing Conditions:

Avoid spraying if temperatures exceed 28°C.

Tank Mixes:

None registered.

Restrictions:

Rainfall: Rain within 6 hours of application may cause poor results. Heavy rainfall may dissolve and carry picloram away from the target area, or it may leach dissolved picloram out of the root zone or to undesirable locations.

Grazing: Do not graze lactating dairy animals within 6 weeks after treatment. There are no grazing restrictions for other livestock. Do not use manure from animals grazing treated forage to fertilize susceptible plants or crops.

Recropping: Tordon 22K may persist in the soil for up to 5 years. For this reason Tordon 22K may only be applied on permanent grass pastures and rangeland unless applied by an authorized pesticide applicator. Avoid the root zone of desirable trees or shrubs.

Aerial Application: Do not apply by air.

Storage: Do not freeze.

Environment: This product is moderately toxic to fish. Apply this product well back from any water bodies to avoid contamination. Heavy rains can move this product from its application site down slope toward sensitive areas. Do not load or mix near wells, dugouts or other water bodies.

Tank Cleaning:

Tordon 22K can cause severe injury to sensitive crops (especially pulses and other broadleaf crops) at very low concentrations. Spray equipment should be flushed out immediately after spraying Tordon 22K. The manufacturer recommends that equipment should be flushed twice with a water/household ammonia rinse (1 L of 3% ammonia per 100 L of water). All nozzles screens and filters should be removed and cleaned after use. Do not clean equipment upslope of water bodies or ditches near crop-land or shelterbelts.

Refer to page 14 for additional information.

Hazard Rating:

▽ Caution Poison.

Touchdown 600 and Touchdown iQ

See Glyphosate section on pages 119

Trifluralin

(Summerfallow use in the brown soil zone of Saskatchewan)

Herbicide Group - 3
(Refer to page 27)

Company:

Bayer CropScience (Rival 10G)
Dow AgroSciences (Advance 10G)
United Agri Products (Bonanza 10G)

Formulation:

Advance, Bonanza 10G, Rival 10G: 10 percent trifluralin formulated as a granule.

Container size - 22.7 kg bag (all), Advance - 454 kg, Bonanza 10G - 500 kg, Rival 10G - 567 kg each in returnable mini bulk bags.

Crops and Staging:

Spring wheat (including durum) in the brown soils zone of Saskatchewan. Not for use in Manitoba.

Apply to summerfallow in May, June, or July for weed control during both years of a fallow-wheat rotation or in the fall (September or October) or spring prior to wheat seeding. Do not apply to stubble when the previous crop was treated with another trifluralin product (Treflan, Advance, Rival or Bonanza). This includes application the previous summer or fall. Do not apply trifluralin to stubble or fallow when the previous year's crop was an oilseed, barley or pulse crop treated with a deep incorporated, spring or fall applied trifluralin product.

Weeds and Staging:

The followed weeds will be controlled prior to emergence:

Fallow Year:
Green foxtail
Wild oat
Persian darnel
Barnyard grass
Russian thistle*
Wild buckwheat
Cow cockle
Lamb's-quarters
Redroot pigweed

Crop Year:
Green foxtail
Wild oat*
Lamb's-quarters
Wild buckwheat*

*Suppression only

Cost (2002 suggested retail price):

$3.22 to $3.29/kg.

Rates:

	RATE (KG/ACRE)			
	5G Formulations		**10G Formulations**	
Soil Organic Matter (%)	**1 to 3**	**4 to 8**	**1 to 3**	**4 to 8**
May	7.7	9	3.85	4.5
June	6.5	7.7	3.25	3.85
July	5.3	6.5	2.65	3.25
	2-8% Organic Matter			
September to October	4.5*		2.75*	
Spring (April or May, in the year of seeding)	4.5*		2.75*	

* Control of green foxtail only.

During the fallow year, susceptible weeds may not be fully controlled until after the second fallow operation has established a uniform layer of treated soil. Control of wild oats in the crop year may be variable depending on wild oat population as well as soil and climatic conditions. Some wild buckwheat may escape but its growth will be retarded and result in limited competition to the wheat crop.

Application:

Do not apply to sandy soils with less than 1 percent organic matter. Application to severely eroded knolls is not recommended. Do not apply to wet soils, soils in poor working condition, soils which contain more than 8 percent organic matter, or soils subject to prolonged periods of flooding.

Granules may be applied to standing or pre-worked stubble, provided trash or green growth does not interfere with cultivation (prevent soil mixing).

Over-application caused by overlapping, improper calibration or non-uniform application may result in reduced crop stand, delayed development or reduced yields.

Close applicator lid after filling to avoid prolonged exposure to direct sunlight.

Incorporation:

May - July: Apply granules to the soil surface and incorporate immediately, in the same operation if possible. Do not delay incorporation more than 24 hours after application. Use a deep tillage cultivator, field cultivator or disc implement set to work 2 to 3 inches (5 to 8 cm) deep, and operating at 8 to 10 km/hr. A second incorporation at the same depth and at an angle to the first should be done when weed growth requires it. Wait at least one week before making the second incorporation. After completing two fallow incorporations, additional operations with a rod weeder, shallow tillage or fall 2,4-D application may be required to control remaining weed growth.

September - October: Apply granules after harvest until freeze-up and incorporate immediately, in the same operation if possible with a deep tillage cultivator, field cultivator or disc implement set to work 2 to 3 inches (5 to 8 cm) deep. Do not delay incorporation more than 24 hours after application. A second incorporation may be done in the fall a minimum of 3 days later. Alternatively, in order to conserve trash cover throughout the winter, the second incorporation can be completed in the spring at the same depth and at an angle to the first incorporation. When both incorporations take place in the fall, shallow spring tillage should be completed in the spring. If a discer or air seeder is used for seeding, separate spring tillage may not be necessary.

Granules should not be incorporated when soil is crusted, lumpy or too wet for good mixing action. Fall application is not recommended on soils where a lack of trash cover combined with the required incorporation would leave the soil vulnerable to erosion.

Spring (April - May): Apply granules and incorporate immediately, in the same operation if possible. Do not delay the first incorporation more than 24 hours after application. The second incorporation must be delayed a minimum of 3 days following the first incorporation. When applied to cold soils, wait 14 days before making second incorporation. The second incorporation should be done at an angle to the first incorporation, and at the same depth. If a discer or air seeder is used for seeding, the seeding operation can be used as the second incorporation.

Seeding:

Allow soil to warm before seeding to reduce risk of injury to crop. Place seed 1.25 to 2.5 inches (3 to 6 cm) deep. If spring seedbed preparation is required, set cultivator 2 inches (5 cm) deep. To reduce the risk of wheat injury, use good quality seed and agronomic practices that will promote good growing conditions. Avoid deep seeding, loose seedbeds and seeding into cold soils. If extended dry periods were present after a fallow application, a 10 percent increase in seeding rate is recommended.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Prolonged drought conditions after a May-July application to fallow may result in higher levels of trifluralin in the soil at the time of seeding. If conditions are not conducive to rapid emergence and growth of the wheat crop (for example cold or dry soil conditions) injury can occur.

Restrictions:

Rainfall: Once the product is incorporated into the soil, rainfall has no effect.

Grazing: Do not graze or cut for hay; insufficient data to support such use.

Recropping: Oats, canaryseed and small seeded forage grasses such as timothy and creeping red fescue should not be grown in rotation following a trifluralin treated crop.

Aerial application: Do not apply by air.

Storage: Store in a cool, dry location, out of direct sunlight.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Danger Poison.

Trifluralin (Green and Yellow Foxtail Control in Cereals)

Herbicide Group - 3
(Refer to page 27)

Company:

Bayer CropScience (Rival)
Dow AgroSciences (Advance, Treflan)
United Agri Products (Bonanza)

Formulations:

Advance 10G - trifluralin formulated as a 10 percent granular in 22.7 kg and 454 kg bags.

Bonanza 10G - trifluralin formulated as a 10 percent granular in 22.7 kg and 500 kg bags.

Bonanza 400 - trifluralin formulated as a 400 g/L emulsifiable concentrate in 10 L, 115 L, 205 L containers.

Rival 10G - trifluralin formulated as a 10 percent granular in 22.7 kg, 567 kg bags.

Rival DF - trifluralin formulated as a 60 percent dry flowable in 7.5 kg bags.

Rival EC - trifluralin formulated as a 500 g/L emulsifiable concentrate in 9 L, 110 L, 200 L, 900 L containers.

Treflan EC - trifluralin formulated as a 480 g/L emulsifiable concentrate in 9.45 L, 115 L containers.

Treflan QR5 - trifluralin formulated as a 5 percent granular in 25 kg, 725 kg bags.

Crops and Staging:

Liquids applied in spring only (after seeding but prior to crop emergence) - spring wheat (including durum), barley.

Granulars applied in fall only (after September 1 but before freeze-up) - spring wheat (including semi-dwarf and durum).

Weeds and Staging:

Pre-emergent control of green and yellow foxtail.

Rates:

LIQUID OR DRY FLOWABLES

PRODUCT	RATES (L OR KG/ACRE)	
	LIGHT AND MEDIUM SOIL TEXTURE	HEAVY SOIL TEXTURE
Rival EC	0.49 to 0.57 L	0.65 L
Rival DF	0.4 to 0.49kg	0.53 kg
Treflan EC	0.49 L	0.69 L
Bonanza 400	0.57 L	0.85 L

GRANULARS (WHEAT ONLY)

PRODUCT	RATES (KG/ACRE)
	All soils (2 - 8% organic matter)
Advance 10G/Rival 10G/Bonanza 10G	2.23
Treflan QR5*	4.45

*Spring applications of Treflan QR5 may also be made at the same rate during the months of April and May only in soils between 2 to 6% organic matter.

Cost (2002 suggested retail prices):

Liquids and dry flowables - $6.35 to $9.86/acre.
Granulars - $7.18 to $8.19/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre) - liquid and dry flowable formulations only.

Pressure: 40 psi (275 kPa) - liquid and dry flowable formulations only.

Nozzles: Flat fan - liquid and dry flowable formulations only..

Incorporation:
Liquid or dry flowable formulations: Apply and incorporate in spring just after seeding. Incorporate to a depth of 1 to 1.5 inches (2 to 4 cm) into a trash free soil (80 percent black when viewed from above) using diamond or tyne type harrows operated at a speed of 6 mph (9 km/h). Incorporate twice, with the second incorporation at right angles to the first. The first incorporation should be performed immediately in the same direction of application. Both incorporations should be done within 24 hours of application. When tank mixing liquid formulations with Avadex BW, follow the same incorporation procedure.
Granular formulations: May be applied to standing or preworked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. Incorporate with cultivators or disc implements only. Perform the first tillage operation within 24 hours of application. Incorporate at a working speed of 5 to 8 mph (8 to 13 km/hr) and to a depth of 2 to 3 inches (5 to 8 cm). Wait a minimum of 5 days, then incorporate a second time at right angles to the first. This second incorporation may be delayed until the following spring. Subsequent working should be no deeper than 2 to 3 inches (5 to 8 cm).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

When using fall applications of the granular formulations, crop injury will occur if soil conditions are not conducive to rapid wheat emergence (for example, cold or dry soil conditions). Weed control is best when soil moisture conditions are good.

Rainfall has no direct effect on product activity. Flooding (3 to 5 days) will cause the rapid breakdown of the product, resulting in reduced weed control. Flooding for 3 weeks or more will result in total product breakdown and loss of weed control.

Tank Mixes:

Herbicides: Liquid trifluralin and Rival DF may be tank mixed with Avadex BW.

Fertilizer: Liquid trifluralin and Rival DF may be applied with liquid fertilizer (for example 28-0-0) as a carrier. Conduct a compatibility test before mixing.

Insecticides: None registered.

Note: The above mixes are those listed on the trifluralin labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: None. Flooding can reduce weed control.

Grazing: Do not graze the treated crop or cut for feed prior to crop maturity.

Aerial Application: Do not apply by air.

Recropping: Do not sow tame oats, canaryseed or small seeded forage grasses one year after spring applications or 21 months after fall applications.

Storage: Granular formulations must be stored in a cool, dry location, out of sunlight.

Rival EC - Do not store below 5°C.
Treflan E.C. - Do not freeze.
Bonanza 400 - Do not freeze.

Recommendations for liquid formulations: Crystalization of the active ingredient may occur at less than 5°C. To reconstitute, bring temperature to 15°C and shake well until no crystals are visible. This should be done before adding to the spray tank.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Keep out of reach of children.

Trifluralin (Broadleaf and Grassy Weed Control)

Herbicide Group - 3
(Refer to page 27)

Company:

Bayer CropScience (Rival)
Dow AgroSciences (Advance, Treflan)
United Agri Products (Bonanza)

Formulations:

Advance 10G: trifluralin formulated as a 10 percent granular in 22.7 kg and 454 kg bags.

Bonanza 400: trifluralin formulated as a 400 g/L emulsifiable concentrate in 10 L, 115 L, 205 L containers.

Bonanza 10G: trifluralin formulated as a 10 percent granular in 22.7 kg, 500 kg bags.

Rival EC: trifluralin formulated as a 500 g/L emulsifiable concentrate in 9 L, 110 L, 200 L, and 900 L containers.

Rival 10G: trifluralin formulated as a 10 percent granular in 22.7 kg, 567 kg bags.

Rival DF: trifluralin formulated as a 60 percent dry flowable in 7.5 kg bags.

Treflan EC: trifluralin formulated as a 480 g/L emulsifiable concentrate in 9.45 L, 115 L containers.

Treflan QR5: trifluralin formulated as a 5 percent granular in 25 kg, 725 kg bags.

Crops and Staging:

Certain formulations are not registered for all the crops listed here. Refer to the specific product label for details. All products are for prelant incorporated use only.

Spring applied liquid, dry flowable or granular formulations:

alfalfa
canola
dry beans
fababeans
forage legumes (cicer
  milk-vetch, alsike clover,
  red clover,
  bird's-foot trefoil)
mustard
peas
safflower
  (liquid formulations)
sunflowers
sainfoin
sweet clover
soybeans

Fall applied granular formulations:

barley
canola
dry beans
fababeans
flax
lentils
mustard
peas
soybeans
sunflowers

Trifluralin liquids, Rival DF: prior to planting shelterbelt transplants (elm, caragana, green ash, Scots pine).

Weeds and Staging:

For pre-emergent control of the following species:

Annual brome species
  (downy, Japanese)
Barnyard grass
Chickweed
Cow cockle
Green foxtail
Knotweed
Pigweed
Lamb's-quarters
Persian darnel
Purslane
Wild buckwheat*
Wild oats*
Yellow foxtail

*Some plants may escape herbicide treatment but are not competitive with the crop.

Costs (2002 suggested retail prices):

Liquids or dry flowable - $8.55 to $19.71/acre.

Granulars - $11.03 to $25.42/acre.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre) (liquid or dry flowable products only).

Pressure: 40 psi (275 kPa) (liquid or dry flowable products only).

Nozzles: Flat fan (liquid or dry flowable products only).

Incorporation: Granular formulations are recommended for use in fall or spring as a pre-plant incorporated treatment on broadleaf crops listed on the product label. The liquid or dry flowable formulations should be used only on soils free of lumps and relatively trash-free (75 percent black) and are recommended only for spring use. Granular formulations may be applied to standing or pre-worked stubble. Very heavy trash fields should be worked prior to application to allow product penetration to the soil surface. Do not use liquid or dry flowable formulations of trifluralin as a pre-plant incorporated treatment in barley, as severe injury will result. Only the fall applications of Advance 10G, Rival 10G, Bonanza 10G or Treflan QR5 are registered for use as pre-plant incorporated treatments in barley. For fall application of granular formulations, work the chemical into the soil between September 1 and freeze-up. Use a discer or field cultivator (vibrating shank-type). Disc implements are preferred on stubble. Set equipment to cut at 3 to

4 inches (8 to 10 cm) depth. The initial incorporation should be done within 24 hours of application.

The second incorporation should be done at right angles to the first. The second incorporation may be delayed until spring, except when planting barley, flax or lentils; for these crops both incorporations must be done in fall. Delay the second incorporation 5 days for better weed control. This will allow greater release of the chemical onto soil particles and assure more even distribution. Fall application of granular trifluralin on flax, lentils or barley is not recommended on soils prone to erosion, as the 2 fall incorporations necessary in these crops may leave soils vulnerable to wind or water erosion.

For spring application of liquid and granular formulations, work the chemical into the soil prior to seeding by setting the implement at 3 to 4 inches (8 to 10 cm) cutting depth. The first incorporation must be done within 24 hours of application. The second incorporation must be done at right angles to the first. If incorporating granular trifluralin, delay the second incorporation for 3 days after the first to achieve better weed control.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Injury to flax, barley or lentils may occur if soil and weather conditions are not conducive to rapid crop emergence (cold or dry soils at the time of seeding and crop emergence).

To minimize crop injury, seed into a firm, moist seed bed. Use a press drill or hoe-drill. Sow barley no deeper than 2 inches (5 cm). Sow lentils and flax no deeper than 1.5 inches (4 cm).

Less than acceptable weed control will result if dry conditions prevail at the time of weed emergence.

Rainfall has no direct effect on products' activity. Flooding (3 to 5 days) will cause rapid breakdown of the product resulting in reduced weed control. Flooding for 3 weeks or more will result in total breakdown of the product resulting in loss of weed control.

Tank Mixes:

Herbicides:

Fababeans: Sencor 75 DF or Sencor 500 (Treflan EC only).

Peas: Sencor (Treflan EC only).

Soybeans: Sencor 500 (use only on KG 20 or McCall) (Treflan EC only). This mixture may cause injury to soybeans if seedlings are weak or slow to emerge.

Dry beans (white and red kidney only): Eptam 8-E (Treflan and Rival liquids only).

Fertilizers: Liquid product and Rival DF may be applied with liquid fertilizer as a carrier. Before the herbicide is added to the tank, compatibility of the herbicide to liquid fertilizer should be tested following instructions on the herbicide container. Trifluralin liquids may be blended with dry bulk fertilizers (do not mix with nitrate fertilizers).

Check label for blending instructions.

Insecticides: None registered.

Note: The above mixes are those listed on the Trifluralin labels only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Rates:

For use in canola, peas, sunflowers, dry beans, mustard, fababeans, seedling alfalfa (spring only), seedling sweet clover (spring only), soybeans.

PRODUCT	**SOIL TYPE**			
	Light soils with less than 6% organic matter		**Medium to heavy soils with 6 - 15% organic matter**	
	Spring	Fall	Spring	Fall
Advance 10G	Not registered	4.45 kg/acre	Not registered	5.67 - 6.88 kg/acre
Rival EC	0.65 L/acre	0.89 L/acre*	0.89 - 1.13 L/acre	1.13 - 1.37 L/acre*
Rival 10G	3.43 kg/acre**	4.45 kg/acre	4.45 - 5.67 kg/acre**	5.67 - 6.88 kg/acre
Rival DF	0.53 kg/acre	0.73 kg/acre*	0.73 - 0.93 kg/acre	0.93 kg/acre*
Treflan EC	0.69 L/acre	0.93 L/acre*	0.93 - 1.21 L/acre	1.21 - 1.37 L/acre*
Treflan QR5	6.9 kg/acre**	8.9 kg/acre	8.9 - 11.3 kg/acre**	11.3 - 13.8 kg/acre
Bonanza 10G	Not registered	4.45 kg/acre	Not registered	5.67 - 6.88 kg/acre
Bonanza	400 0.81 L/acre	1.11 L/acre*	1.11 L/acre	1.42 L/acre*

* Although liquid and dry flowable formulations are registered for fall application, this use is not recommended as tillage requirements before and after application will predispose fields to erosion.

**Spring applications of granular formulations are recommended for Manitoba only.

For use in barley (fall only), apply:

	SOIL TYPE					
	2 - 4% organic matter		**4 - 6% organic matter**		**6 - 10 % organic matter**	
PRODUCT	**Light Soil Texture***	**Medium to Heavy Soil Texture****	**Light Soil Texture***	**Medium to Heavy Soil Texture****	**Light Soil Texture***	**Medium to Heavy Soil Texture****
Advance 10G	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre	Not recommended	Not recommended
Rival 10G, Bonanza 10G	3.44 kg/acre	3.44 kg/acre	4.45 kg/acre	4.45 kg/acre	4.45 kg/acre	5.67 kg/acre
Treflan QR5	6.9 kg/acre	8.9 kg/acre	8.9 kg/acre	11.3 kg/acre	Not recommended	Not recommended

* Light textured soils can be defined as Sandy to Sandy loam.

** Medium to Heavy textured soils can be defined as loam to clay.

For use in flax or lentils (fall only), apply:

PRODUCT	SOIL TYPE			
	Soils with 2-6% organic matter		Soils with 6-15% organic matter	
	Light Soil Texture*	Medium-Heavy Soil Texture**	Light Soil Texture*	Medium-Heavy Soil Texture**
Advance 10G, Rival 10G, Bonanza 10G	4.45 kg/acre	4.45-5.6 kg/acre***	5.67 kg/acre	5.67 - 6.88 kg/acre
Treflan EC	0.93 L/acre	1.21 L/acre	1.21 L/acre	1.21-1.38 L/acre
Treflan QR5	8.9 kg/acre	11.3 kg/acre	11.3 kg/acre	11.3 - 13.8 kg/acre

* Light textured soils can be defined as Sandy to Sandy-loam.
** Medium to Heavy textured soils can be defined as loam to clay.
*** Rates vary among products. Refer to product label for specific information.

Restrictions:

Rainfall: None. Flooding may reduce weed control.

Grazing: Do not graze the treated crops or cut for feed prior to crop maturity.

Recropping: Oats, canaryseed, and small-seeded grasses may be affected the year after treatment. Corn is sensitive at higher rates of application. Damage to wheat can occur if the crop is seeded into land that has been treated during the previous 21 months with trifluralin products and has received abnormally low amounts of precipitation. Damage is worse if conditions are not conducive to rapid emergence of the wheat (for example, if the crop is seeded deep or if soil conditions remain cool during emergence). Damage tends to be greater on fields treated with granular formulations.

Aerial Application: Do not apply by air.

Storage: Granular formulations must be stored in a cool, dry location, out of sunlight.

Rival EC - Do not store below 5°C.
Treflan E.C. - Do not freeze.
Bonanza 400 - Do not freeze.

Recommendations for liquid formulations: Crystalization of the active ingredient may occur at less than 5°C. To reconstitute, bring temperature to 15°C and shake well until no crystals are visible. This should be done before adding to the spray tank.

Tank Cleaning:

Refer to page 14

Hazard Rating:

Keep out of reach of children.

Triumph Plus

Herbicide Group – 1, 2, 4
(Refer to page 27)

Company:

Bayer CropScience

Formulation:

The Triumph Plus package contains 2 components:

Triumph FM: 56 g/L fenoxaprop-p-ethyl and 256 g/L MCPA ester formulated as an emulsifiable concentrate. Container size – 2 x 13.3 L.

Plus: 75 percent thifensulfuron methyl formulated as a dry flowable. Container size – 2 x 162 g (imbedded in Triumph FM jug).

Crops and Staging:

Spring wheat (not including durum)- 2 to 6 leaf stage, maximum 3 tillers

Seedling forage grasses at the 2 to 4 leaf stage:
Bromegrass (meadow and smooth)
Creeping red fescue
Tall fescue
Wheatgrass (intermediate, northern, slender, tall, western)

Crop injury (yellowing, stunting and in some instances pinching of tillers) can occur with applications of Triumph Plus made beyond the recommended leaf stage. Roblin wheat is particularly sensitive to applications of Triumph Plus made at leaf stages beyond the recommended range. To minimize the risk of injury, apply the product within the recommended range.

Weeds and Staging:

Grass weeds controlled at the 1 to 6 leaf stage with a maximum of 2 tillers. Apply at the 2 to 3 leaf stage for optimum control:
Foxtail (green and yellow)
Wild oats

Broadleaf weeds controlled at the 2 to 4 leaf stage or less than 4 inches (10 cm) across, unless othewise stated:
Annual Sunflower
Ball Mustard
Burdock
Canada Thistle*
Chickweed (1 to 6 leaf)
Cocklebur
Corn spurry
Cow cockle
Field horsetail**
Flixweed***
Green smartweed
Hemp-nettle
Hoary cress**
Kochia
Lady's-Thumb
Lamb's-quarters
Mustards (except dog and green tansy)
Plantain**
Prickly Lettuce
Ragweeds
Redroot pigweed
Russian pigweed
Russian thistle
Stinkweed***
Shepherd's Purse***
Vetch
Volunteer Canola°
Wild Buckwheat (1 to 3 leaf)
Wild Mustard
Wild Radish

* Suppression only
** Top growth control only
*** Spring seedlings only
° May not give satisfactory control of CLEARFIELD canola varieties

Cost (2002 suggested retail price):

$20.96/acre

Rates:

The Triumph Plus package will treat 40 acres.

Refer to the product label for complete mixing instructions.

A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 5 to 10 gallons/acre (23 to 45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: 80° or 110° stainless steel flat fan nozzles tilted forward at a 45° angle. Screens 50 mesh or larger.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Do not apply to crop that is stressed by severe heat, frost, low fertility, drought, water-saturated soil, disease or insect damage as crop injury and poor weed control may result.

Tank Mixes:

Herbicides: In spring wheat (not durum):
Lontrel (85 mL/acre).

Fertilizers: None registered.

Insecticides: None registered.

Do not tank mix with any other chemical additive, pesticide or fertilizer. Do not use a surfactant with this tank mix.

An interval of 7 days prior to application, or 4 days after application with Triumph Plus, is required before any other pesticide can be applied.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: Within 2 hours may reduce weed control.

Grazing: Do not graze treated crops or cut for feed prior to crop maturity.

Preharvest Interval: Do not apply within 80 days of harvest.

Recropping: No restrictions the year after treatment.

Aerial Application: Do not apply by air.

Storage: Do not freeze. If stored for 1 year or longer, shake well before using.

Environment: Do not apply within 15 m of a body of water or wetland area.

Tank Cleaning:

The "Plus" component of Triumph Plus can cause severe injury to sensitive crops at very low concentrations. Sprayers used to apply Triumph Plus should be flushed out immediately after use. The manufacturer recommends that sprayers used to apply this product be flushed twice with a water/household ammonia (1L of 3% household ammonia per 100 L water) rinse prior to using the sprayer on sensitive crops. All nozzles, screens and filters should be removed and cleaned after applying this product.

Refer to page 14 for additional information.

Hazard Rating:

◈ Warning Poison

Skin and Eye Irritant

Trophy

Herbicide Group – 4

(Refer to page 27)

Company:

Nufarm

Formulation:

The Trophy package has 2 components:

Starane contains 180 g/L fluroxypyr

MCPA Ester contains 500 g/L MCPA ester.

Trophy is formulated as an emulsifiable concentrate.

Container size: Starane – 4.8L, MCPA ester – 9L. One case treats 20 acres.

Crops and Staging:

Spring wheat (not including durum) and barley at the 3 leaf to flag leaf stage.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled at the 2 to 4 leaf stage, unless specified include:

Burdock
Cleavers (1-4 whorls)
Clover (sweet)
Cocklebur
Flixweed
Hemp Nettle (2-6 leaf)
Kochia
Lamb's-quarters
Mustards (except dog and tansy)
Prickly lettuce
Ragweed
Shepherd's-purse
Stinkweed
Sunflower (annual)
Vetch
Volunteer canola
Volunteer flax
Wild radish
Wild mustard

Weeds suppressed include:

Smartweed (green)
Stork's-bill
Wild buckwheat (1-4 leaf)

Cost (2002 suggested retail price):

$9.90/acre.

Rate:

Apply Starane at 0.24 L/acre and MCPA Ester at 0.45 L/acre. One case of Trophy treats 20 acres. Make only one application per year.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Trophy activity is influenced by weather conditions. The temperature range for optimum activity is 12°C to 24°C. Reduced activity will occur when temperatures are below 8°C or above 27°C. Frost 3 days before or after application may reduce weed control and crop tolerance. Weed control may be reduced during stress conditions (drought, heat or cold stress) or if extremely heavy infestations exist.

Tank Mixes:

Herbicides:
In barley:
Achieve 80DG (0.1 kg/acre) plus Turbocharge adjuvant.
In spring wheat (not including durum):
Assert (0.53 to 0.65 L/acre) plus pH adjuster
Horizon (0.095 to 0.115 L/acre) plus Score adjuvant.
Puma Super (0.4 L/acre)
Puma 120 Super (0.308 L/acre)

Insecticides: None registered.

Fungicides: None registered.

Adding ingredients in the correct order is critical for optimum performance. Check labels of products to be mixed for directions. General guidelines can be found on page 13.

Restrictions:

Rainfall: No rainfast period is specified on the label; required interval may be up to 8 hours. Contact manufacturer for more information.

Grazing: Do not permit lactating dairy animals to graze fields within 7 days of application. Do not harvest forage or cut hay within 30 days of application. Withdraw meat animals from treated fields at least 3 days before slaughter.

Preharvest: Do no apply within 60 days of harvest.

Recropping: Wheat, barley, oats, rye, forage grasses, flax, canola, mustard, lentils and peas may be grown the year after a Trophy application. There are no recropping restrictions the second year after application.

Aerial Application: Do not apply by air.

Storage: May be frozen. If frozen, bring to room temperatures and agitate before use.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

DangerPoison.

Warning Eye Irritant.

Caution Skin Irritant.

Ultim*

Herbicide Group – 2

(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

37.5% rimsulfuron and 37.5% nicosulfuron formulated as a water dispersible granule. Container size – 134.8 g (4 x 33.7 g water soluble bags).

Crop and Staging*:

The following field corn hybrids at the 1 to 4 leaf stage:

Pioneer Brands 39K72, 39K73, 39W54, 39M27.

* Since this product is registered under minor use application, the manufacturer assumes no responsibility for herbicide performance. Users of this product do so at their own risk.

Weeds and Staging:

No information is provided on the label for leaf staging. The manufacturer recommends the following staging:

wild oats – 3 to 6 leaf stage

green foxtail, yellow foxtail, barnyard grass, volunteer cereals – 1 to 6 leaf stage (up to 2 tillers)

quackgrass – 3 to 6 leaf stage (with extended leaf 4 to 8 inches long)

redroot pigweed – 2 to 6 leaf stage

Contact the manufacturer for additional weeds not listed on the label.

Cost (2002 suggested retail price):

$22.95/acre

Rates:

Apply Ultim 75 DF at 13.5 g/acre. One bag of Ultim will treat 2.5 acres (10 acres per container). Add a non-ionic surfactant (AgSurf, Agral 90, Citowett Plus) at 0.2 L per 100 L of spray solution.

Apply Ultim with 24 hours of mixing, as product degradation may occur resulting in reduced weed control. Refer to the product label for complete mixing instructions.

Application Information:

Water Volume: Minimum 10 gal/acre (45 L/acre); for best results apply 12.5 to 17.5 gal/acre (60 to 80 L/acre).

Nozzles and Screens: Flat fan nozzles with 50 mesh or larger screens.

Effects of Growing Conditions:

Rapid fluctuations in temperature (greater than 20oC difference within 24 to 36 hours) will stress the corn crop. For maximum crop safety, allow 48 to 72 hours for the corn to acclimatize before applying Ultim.

Apply ONLY when the temperature in the 24 hours before AND after application is between 5oC and 28oC. Temperatures beyond this range increase the potential for crop injury. Separate applications of Ultim herbicide followed by a broadleaf herbicide (minimum 12 hours later) will reduce the potential for injury.

WARNING: Crop injury may result if application is made to corn that has been stressed by abnormally hot, humid or cold weather conditions, frost, low fertility, drought, water saturated soil, compacted soil, previous pesticide applications, disease or insect damage. If corn has been injured by frost, wait 48 to 72 hours before applying Ultim.

Tank Mixes:

Herbicides: None registered.

Insecticides: None registered.

Fungicides: None registered.

Ultim should NOT be applied to corn that has been treated with Counter, Cygard, Thimet, Lorsban, or Di-Syston. Application of Ultim to corn previously treated with Dyfonate may result in temporary yellowing or stunting of crop. Leave seven days between the application of Ultim and that of a foliar organophosphate insecticide.

Restrictions:

Rainfall: Within 2 to 4 hours of application may reduce weed control.

Grazing: Do not graze treated crops or cut for hay.

Preharvest Interval: Do not apply within 30 days of harvest.

Recropping: Field corn, winter wheat and spring barley may be planted the year following Ultim application. For all other crops, a field bioassay is recommended before planting.

Aerial Application: Do not apply by air.

Storage: Store product in original containers in a secure, dry area, away from other pesticides, food, or feed.

Environment: Leave a 5 m buffer between the last spray path and woodlots or shelterbelts. Leave a 10 m buffer before wetland areas or water bodies.

Tank Cleaning:

Drain tank and hose down interior surfaces. Flush tank, hoses, boom, and nozzles with clean water for a minimum of 5 minutes. Fill tank with water while adding 1 litre of household ammonia (minimum 3 percent ammonia) for every 100 L of water. Flush hoses, boom and nozzles with the cleaning solution, then add more water to completely fill the tank. Circulate for 15 minutes. Again flush hoses, boom and nozzles with the cleaning solution, then drain the tank. Remove and clean the nozzles and screens separately in a bucket containing a 1 percent solution of ammonia in water. Repeat the above process and then thoroughly rinse the tank with clean water for a minimum of 5 minutes, flushing the water through the hoses and boom. Prior to using the sprayer for the next application, flush the tank, boom and hoses for 5 minutes with fresh water. Do not clean equipment where cleaning solution could flow towards water bodies, ditches, cropland, shelterbelts, or areas where people are likely to frequent or walk.

For additional information, refer to page 14.

Hazard Rating:

Warning – Eye Irritant

Caution – Skin Irritant

Unity

(Not for use in Manitoba)

Herbicide Group – 2,6

(Refer to page 27)

Company:

Bayer CropScience

Formulation:

Unity 280 EC: 280 g/L bromoxynil formulated as an emulsifiable concentrate.

Unity 75 WG: 75 percent triasulfuron formulated as a dispersible granule.

Container size - one case of Unity 280 EC plus Unity 75 WG contains 2 x 4 L jugs of Unity 280 EC and 4 x 43 g water soluble bags of Unity 75 WG.

Crops and Staging:

Spring wheat (including durum), and barley at the 2 leaf to just prior to flag leaf. For use in the brown and dark brown soil zones of Saskatchewan only.

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds and Staging:

Weeds controlled at the 2 to 4 leaf stage:

Chickweed
Cleavers
Cow cockle
Flixweed
Green smartweed
Hemp-nettle
Kochia
Lady's-thumb
Lamb's-quarters
Redroot pigweed
Shepherd's-purse
Stinkweed
Wild buckwheat
Wild mustard
Volunteer canola

Caution:

Several crops are sensitive to low concentrations of Unity 75 WG in the soil. Therefore, careful consideration should be given to crop rotation plans prior to using. The Unity tank mix is registered for use in Saskatchewan in the brown and dark brown soil zones only. The degradation of Unity 75 WG in the soil is affected by rainfall, soil temperature and soil pH. If you are considering using this product, be sure to read the recropping restrictions outlined in the product label.

Cost (2002 suggested retail price):

$7.25/acre.

Rates:

One case treats 40 acres. Add a recommended non-ionic surfactant such as Citowett Plus, Agral 90, Agsurf, Super Spreader or Companion at 0.25 L per 100 L spray solution.

Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Application Information:

Water Volume: 10 gallons/acre (45 L/acre).

Pressure: 40 psi (275 kPa).

Nozzles: Flat fan. 50 mesh screens or coarser.

Mixing Instructions:

Add Unity 75 WG water soluble bags first to 1/4 full sprayer. Allow at least 6 minutes for complete mixing. Add Unity 280 EC.

Allow a further two minutes mixing. Fill sprayer, and add surfactant. Do not allow mixture to stand without agitation.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Adequate control may not be achieved under unfavourable conditions such as drought, flooding or prolonged temperature extremes.

Recropping Restrictions:

CROP	MINIMAL INTERVAL (MONTHS) Soil pH 6.4 or less	Soil pH 6.5 - 7.4	Soil pH 7.5 or greater
Spring Wheat (hard red, Canada prairie, extra strong)	No Restrictions	No Restrictions	No Restrictions
Barley, Oats, Durum Wheat	10	10	10
Flax	10	10	22
Peas	10	22	22
Canola	10	22	34
Canaryseed	22	22	22
Mustard	22	22	34
Lentils, Sunflowers, All other crops	Bioassay	Bioassay	Bioassay

Tank Mixes:

Herbicides:
In Spring wheat (including durum):
Horizon

Fertilizers: None registered.

Insecticides: None registered.

Note: The above mixes are those listed on the Unity label only. To check for other possible mixes see the blue fold out chart inside the back cover.

Adding ingredients in the correct order is critical for optimum performance. Check labels of both products to be mixed for directions.

Restrictions:

Rainfall: Do not apply if rainfall is expected within 2 hours.

Grazing: Do not graze treated crops or cut for hay until 30 days after application.

Recropping: Some crops have shown a high sensitivity to low residues of Unity 75 WG in the soil. The risk of injury to rotational crops is affected by a number of factors including soil factors (soil type and soil pH), environmental factors (soil temperature, precipitation), crop species, and recropping interval. Breakdown in soil of Unity 75 WG is more rapid with conditions of high moisture, high temperature, and low pH.

To avoid injury to subsequent crops after an application of recommended rates of the Unity tank mix, the recropping intervals outlined in the previous table should be observed:

A field bioassay involves growing test strips of the crop(s) intended for production the following year in fields previously treated with the Unity tank mix. Crop response will dictate whether or not to rotate to the crop(s) used in the test strip. See Bioassay Guidelines section of product label. Apply the Unity tank mix only once per year to the same field.

Aerial application: Do not apply by air.

Storage: Do not freeze.

Environment: Leave at least a 15 m buffer zone around wildlife habitat. Do not apply to irrigated land.

Tank Cleaning:

Unity can cause injury to sensitive crops at low concentrations. Clean sprayer immediately after use. Do not clean near desirable vegetation, wells or other water sources. Drain and flush tank and boom with water and household detergent. Add 1 L household ammonia (3 percent) and 100 L water to spray tank and allow to agitate for 15 min. before flushing through nozzles. Wash nozzles and screens in the water/ammonia mix in pail. Rinse system with clean water for 5 minutes.

For additional information, refer to page 14.

Hazard Rating:

◈ Warning Poison

Vanquish

Herbicide Group – 4

(Refer to page 27)

Company:

Syngenta

Formulation:

480 g/L dicamba acid present as a dimethylamine salt formulated as a solution. Container size – 10 L.

Crops and Stages:

Range, pasture and non crop areas. Application stage is not specified.

Weeds, Staging and Rates:

Weeds Controlled		Rate (L/acre)
Absinthe* Canada thistle* Leafy spurge*	Perennial sow-thistle* Povertyweed* Scentless chamomile*	0.5
Canada thistle Common ragweed Curled dock* English daisy False ragweed (Marsh elder)	Field bindweed Giant ragweed Goldenrod Perennial sow-thistle	0.93
Diffuse knapweed Goat's-beard Ground cherry Pasture sage	Povertyweed Sheep sorrel Thyme-leaved spurge	1.86
Baby's-breath Braken fern* Fringed sagebrush	Perennial cinquefoil spp.* Russian knapweed* Sheep-laurel	3.72

* Top-growth control only

For woody species see tank mixes.

Cost (2002 suggested retail price):

$31.50/L

Application Information:

Water Volume:

Broadcast treatments: 20 to 30 gallons/acre (90 to 135 L/acre) to ensure good coverage.

Wand treatment: apply until the point of runoff.

Pressure: Less than 40 psi (275 kPa)

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Drift from Vanquish can cause severe damage to sensitive plants. Apply in the morning or the evening when temperatures are between 10° and 25°C.

Do not apply when:

Winds are in excess of 8 km/hr or gusty and are blowing in the direction of sensitive non-target plants.

Daytime temperatures are expected to exceed 30°C.

Conditions of high humidity or fog are present.

Tank Mixes:

Herbicides:

Broadcast treatment:

Vanquish tank mixed with 2,4-D amine will control the following species. See label for rates.

Poison ivy
White (paper) birch
Willow

Wand treatment:

Vanquish tank mixed with 2,4-D amine or ester will control the following woody species. See label for rates.

Alder
Balsam fir
Balsam poplar
Birch
Black cottonwood
Bur oak
Cherry
Elm
Hickory
Pine
Red oak
Spruce
Sugar maple
Tamarack
Vine maple
Western snowberry
White ash
White cedar
Wild rose
Wolf (silver) willow

Fertilizers: None

Insecticides: None

Restrictions:

Rainfall: No rainfree period specified on the label. The required interval may be up to 8 hours. Contact the manufacturer for more information.

Grazing: Restrictions on grazing and harvesting treated areas for hay are as follows

Dairy Cattle:

- up to 0.5 L/acre no restriction
- 0.5 to 0.93 L/acre - wait 7 days
- 0.93 to 1.86 L/acre – wait 14 days
- 1.86 to 2.87 L/acre – wait 30 days

Meat Animals: if treated vegetation is consumed within 30 days of treatment, feed animal untreated feed for 30 days before slaughter. No restrictions if treated forage is fed 30 days after treatment.

Aerial Application: May be applied by air in a minimum of 18 gallons (85 L) per acre when wind is less than 15 km/hr and moving away from sensitive areas.

Storage: Thaw and shake well if frozen.

Environment: Do not contaminate water for irrigation or domestic consumption. Do not mix or apply in areas where the product may wash into the root zone of desirable trees or shrubs.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

▽ Caution - Poison

Warning - Eye irritant

Velpar DF

Herbicide Group – 5
(Refer to page 27)

Company:

DuPont Canada Inc.

Formulation:

75 percent hexazinone formulated as a water dispersible granule - Container size: 2 kg.

Crops and Staging:

Established alfalfa for seed. Apply in late fall prior to freeze-up when alfalfa is dormant or in early spring before alfalfa growth resumes. Apply only on alfalfa that has been established for 18 months or longer. If burning or irrigation is to be carried out, do not apply until these operations have been completed. Do not apply to frozen ground.

Weeds and Staging:

Application stage is dictated by the crop above

Dandelion
Narrow-leaf hawk's beard
Sow-thistle
Quackgrass
Scentless chamomile

Cost (2002 suggested retail price):

$22.26 to $44.52/acre.

Rates:

Velpar DF - 0.272 to 0.544 kg/acre. Use the lower rate on medium-textured soils with low organic matter. Do not apply to soils with less than 1 percent organic matter.

Application Information:

Water Volume: 20 gallons/acre (90 L/acre).

Pressure: 30 to 40 psi (200 to 275 kPa).

Nozzles: Flat fan.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Adequate soil moisture is required for activation of the product.

Tank Mixes:

Herbicides: None registered.

Fertilizers: None registered.

Insecticides: None registered.

Restrictions:

Rainfall: Rainfall is beneficial for activation of the product.

Grazing: Do not graze the treated crop or cut for feed.

Recropping: Insufficient information is available. Velpar residues will persist for 2 or more years after application.

Aerial Application: Do not apply by air.

Storage: May be frozen.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

Danger Corrosive

Caution Flammable

Venture

Herbicide Group – 1
(Refer to page 27)

Company:

Syngenta

Formulation:

Venture - 125g/L fluazifop-p-butyl formulated as an emulsifiable concentrate. Container size 2 x 8 L.

Crops and Staging:

Preharvest intervals must be followed to avoid unacceptable residues of fluazifop-p-butyl in harvested crops.

Crop	Crop Stage	Harvest Interval
Alfalfa	No restrictions	41
Bird's-foot trefoil and red clover	No restrictions	Do not graze or feed in year of treatment
Canola	Do not apply past 5th leaf	80
Creeping red fescue	2-5 leaf	For seed only
Flax (including Solin – low linolenic flax)	No restrictions	80
Lentil	Do not apply past 6th node	70
Mustard	Do not apply past 5th leaf	75
Peas	No restrictions	66
Potatoes	No restrictions	90
Soybeans	Up to 3rd trifoliate leaf	90
Sunflowers	No restrictions	120

When tank mixing, always check the tank mix partner recommendations for additional staging restrictions.

Weeds, Rates and Staging:

Weed	Weed Stage	Rate (L/acre)	Acres per 8 L
Volunteer corn	2 to 5 leaf stage	0.24	33
Volunteer wheat and barley, persian darnel, barnyard grass	2 to 5 leaf stage	0.32	25
Wild oats	2 to 5 leaf stage	0.40	20
Quackgrass suppression in canola and soybeans	3 to 5 leaf stage	0.40	20
Green and yellow foxtail	2 to 4 leaf stage	0.57	14
Quackgrass suppression (all crops)	3 to 5 leaf stage	0.80	10

Cost (2001 suggested retail price):

$26.01/L

Application Information:

Water Volume: 5 to 20 gallons/acre (20 to 80 L/acre).

Pressure: 30 to 60 psi (200 to 400 kPa).

Nozzles: 80° or 110° flat fan nozzles.

How it Works:

Refer to Table 2 on page 29.

Effects of Growing Conditions:

Less than acceptable weed control may be expected if weeds are under stress because of excessive moisture, drought, or cool weather.

Tank Mixes:

Herbicides:

In canola:
Muster (Argentine varieties only)
Lontrel

In alfalfa, bird's-foot trefoil & red clover:
2,4-DB

In creeping red fescue:
Ally

In soybean:
Basagran + Assist

In potato:
Sencor (reduced grass control from Venture may result)

Fertilizers: none registered.

Insecticides: none registered.

When applying other broadleaf herbicides in the same field, apply the product no sooner than 3 days after application of Venture.

Adding ingredients in the correct order is critical for optimum performance. Refer to the product label for complete mixing instructions for this product and its mixes. A general guide to mixing can be found on page 13.

Restrictions:

Rainfall: Activity is not affected by rainfall if it occurs at least two hours after application.

Grazing: Do not graze crops or cut for hay in the year of treatment.

Preharvest Interval: See section.

Recropping: Seed only broadleaf crops listed on this label if seeding must occur within 60 days of application.

Aerial Application: Do not apply by air.

Storage: Product is not affected by temperatures below 0°C.

Environment: Do not apply within 15 m of fish-bearing waters and wildlife habitats.

Tank Cleaning:

Refer to page 14.

Hazard Rating:

▽ Caution Poison

Experimental studies have shown that the active ingredients in this product may cause birth defects in laboratory animals.

Women capable of bearing children should avoid contact with this product.

Special Weed Problems

This section identifies specific weeds and some herbicides recommended for control. Refer to the particular crop section or the product label for information on specific products that may be used on the crops and for application instructions.

Absinthe

2,4-D LV Ester (500 g/L) - In grass pastures with no legumes, spray 1.82 L/acre in late June, prior to flowering. Re-treat regrowth in late summer when plants have 6 to 10 inches (15 to 25 cm) of new growth. More than 1 season of treatment may be required.

DyCleer - In grass pasture and rangeland only, apply 0.5 L/acre in 20 to 30 gallons (90 to 135 L) per acre for top-growth control when leaves are fully expanded.

Alders

2,4-D LV Ester (500 g/L) - In grass pastures and non-crop land, apply 1.78 L/acre to the foliage of actively growing brush.

Banvel II + 2,4-D amine or LV ester (500 g/L) - In grass pastures, rangeland and non-crop land, apply Banvel II at 2.1 L per 1,000 L of water with 2,4-D LV ester or amine at 4.0 L per 1,000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

Aspen Poplar (Trembling Aspen)

Banvel II + 2,4-D amine or LV ester (500 g/L) - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.32 L/acre with 2,4-D LV ester or amine at 1.78 L/acre in 20 gallons/acre (90 L/acre) water to the foliage of actively growing brush in spring or early summer.

Remedy EC - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

Baby's Breath (Perennial)

Banvel II - In grass pastures with no legumes, apply 3.72 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water when actively growing.

DyCleer - In grass pasture and rangeland only, apply 3.72 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Biennial Wormwood

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing plants.

Black Medic

Buctril M/Dichlorprop +2,4-D/Mecoprop/Target/2,4-D amine or LV ester - Apply in registered crops at registered rates to black medic in the 1 to 4 leaf stage for suppression only.

Chokecherry

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

Remedy EC - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details. May need the higher rates for control and retreatment the following year.

Common Tansy

Glyphosate - Apply at 1.9-2.8 L/acre in 10 gallons of water/acre (40 L/acre) to actively growing plants that are 8-10 inches (20-25 cm) tall (summerfallow, stubble and non-cropland).

Escort - In pastures, rangeland and rough turf, apply 8 g/acre in 10 to 20 gallons/acre (45 to 90 L/ acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Curled Dock

Banvel II - As a patch treatment, apply 0.92 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

Glyphosate - As a spot treatment, apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

MCPA amine, 2,4-D amine - Apply 0.445 to 0.69 L/acre of formulations containing 500 g/L MCPA or 2,4-D amine to give top growth control.

Dichlorprop + 2,4-D - 0.71 L/acre for suppression before plants are 2 inches (5 cm) tall.

Remedy EC - In grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

DyCleer - In grass pasture and rangeland only, apply 0.93 L/acre in 20 to 30 gallons (90 to 135 L) per acre for top-growth control when leaves are fully expanded.

Diffuse Knapweed

Banvel II - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds.

Tordon 22K - In rangeland and grass pasture, apply 0.91 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Downy Brome and Japanese Brome

Glyphosate - Prior to crop emergence, apply 0.51 to 0.77 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water before downy brome is 6 inches (15 cm) in height.

Rustler - Prior to crop emergence, apply 1.0 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water between emergence and heading of downy brome.

Trifluralin - Apply at recommended rates for weed control in broadleaf crops prior to emergence.

Field Bindweed

Banvel II - As a patch treatment, apply 1.0 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply when field bindweed is in the flowering stage and allow 3 weeks after treatment before resuming normal summerfallow tillage.

Basagran - In labelled crops, apply 0.71 L/acre followed by 0.71 L/acre 7 to 10 days later. Apply in 20 to 35 gallons/acre (90 to 160 L/acre) water before field bindweed has developed a dark green colour and before it has begun trailing. Use a recommended surfactant (see recommendations under the appropriate crop).

2,4-DB - As a spot treatment in labelled crops apply 2.83 to 4.86 L/acre in 10 gallons/acre (45 L/acre) water at the bud stage. Do not disturb plants for at least 10 days following treatment. Heavy rainfall within 2 hours of application may wash chemical off the foliage and a repeat treatment may be required. Rainfall occurring within 6 hours after application may reduce control.

2,4-D amine - In grass pastures containing no legumes or as a spot treatment, apply 1.82 L/acre of formulations containing 500 g/L 2,4-D amine at early flowering stage.

Glyphosate - As a spot treatment, apply 2.8 to 4.9 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) at the full bloom stage or beyond. Allow 7 or more days after application before tillage.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Remedy EC - In grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

DyCleer - In grass pasture and rangeland only, apply 0.93 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Field Horsetail

MCPA amine, potassium and sodium salt mixtures - Apply 0.57 L/acre of formulations containing 500 g/L MCPA after the weeds have fully emerged for top growth control. May be used in wheat, oats, barley, flax and rye.

Amitrol 240 - Apply 5.0 to 6.7 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is young and actively growing.

Foxtail Barley

Gramoxone - Apply 2.23 L/acre in 98 gallons/acre (445 L/acre) water or 75 mL in 2.2 gallons (10 L) water/1076 square feet (100 sq. m) for top growth control only.

Kerb 50-W - Apply 0.364 to 0.445 kg/acre product in 20 gallons/acre (90 L/acre) water between October 1 and freeze-up. Use the lower rate on grey-wooded soils or where perennial bluegrass or fescues are the predominant pasture species. Do not use Kerb for foxtail barley removal in seed grass stands or desired foliage stands of timothy or fescue grass species. At recommended rates, pasture stands of perennial bluegrass and fescue may be reduced by 10 to 15 percent. Where perennial bluegrass and fescues are the dominant pasture species, use the lower rate of Kerb. Spray overlaps may seriously harm desirable pasture grass species. Where the grass stand comprises mostly foxtail barley and reseeding to a desirable grass species is required, delay seeding into the Kerb-treated soil until the end of June. Do not harvest or graze within 60 days of application with Kerb. Avoid using Kerb on soils having more than 6 percent organic matter.

Glyphosate - Prior to crop emergence, apply 1 to 2 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water to foxtail barley at the seedling to heading stage. Late fall applications may provide better control of established plants than spring applications.

Roundup Transorb - In Roundup ready canola, apply 2 applications, each at 0.5 L/acre, for season long control.

Rustler - Prior to crop emergence, apply 1.26 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water to foxtail barley before initiation of the seed head for suppression only.

Sundance - Apply at 11 g/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water prior to flowering.

Goat's-Beard

2,4-D amine - Apply 0.91 L/acre of formulations containing 500 g/L in early fall or early spring.

Dichlorprop + 2,4-D - Apply 1.62 L/acre in early spring or fall.

DyCleer - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Gumweed

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 0.89 L/acre to the foliage of actively growing plants.

Hemp Dogbane

Glyphosate - Apply 2.83 to 4.86 L/acre when hemp dogbane is in the early bud stage. Apply in 10 gallons/acre (45 L/acre) water. Do not disturb treated plants for at least 7 days after application.

2,4-D amine or LV ester - Apply 1.38 to 1.82 L/acre of formulations containing 500 g/L 2,4-D in fall before frost and while plant leaves are green.

Hoary Cress

Amitrol 240 - For non-selective patch treatment in pastures and non-crop land, apply 8.9 to 13.8 L/acre.

Glyphosate - As a spot treatment in labelled crops, apply 2.83 to 4.86 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water when most plants have reached the early bud stage. Do not disturb treated plants for at least 10 days following treatment.

Leafy Spurge

Amitrol 240 - Apply 15.2 to 18.5 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is between the late stages of flowering and early seed development.

Banvel II - Apply 0.84 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water for top growth control when the weed is actively growing.

2,4-D amine - Apply 1.82 L/acre of formulations containing 500 g/L 2,4-D at early flowering stage. Repeat at least once to new growth later in the season. Control of established plants and new seedlings will require continued applications for a period of at least 4 to 5 years.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 0.5 L/acre in 20 to 30 gallons (90 to 135 L) per acre for top-growth control when leaves are fully expanded.

Locoweeds, Lupines, and Milk-vetches

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 to 2.75 L/acre at the full bloom stage.

Remedy EC - To control vetches in grass pasture and rangeland apply 0.4 to 1.62 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Backpack method is also available - See Remedy section for details.

Milkweed

Amitrol 240 - Apply 7.6 to 11.3 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures in the early summer when all the shoots have emerged.

Glyphosate - When making preharvest applications, use 1.0 L/acre. For patch treatments, apply 4.86 L/acre in 10 gallons/acre (45 L/acre) water. Apply when most plants have reached the bud to bloom stage. Reduced results may occur on plants treated after full bloom as not all milkweed plants reach the required stage of growth at the same time. Repeat treatments may be required. Do not disturb plants for 10 days following treatment. Do not apply to plants covered with dust.

Narrow-leaf Hawk's-beard

2,4-DB - Apply to forage legume crops at recommended rates at the 2 to 4 leaf stage of narrow-leaf hawk's-beard, after legume growth in the fall has stopped.

2,4-D LV ester (500 g/L) - In fall stubble, apply 0.57 to 0.90 L/acre to fall rosettes.

Express Pack - In registered crops and summerfallow, apply at registered rates to spring seedlings less than 4 inches (10 cm) across or to fall rosettes.

Glyphosate - Prior to crop emergence, apply 0.51 to 0.77 L/acre in 5 to 10 gallons/acre (23 to 45 L/acre) water. Use the high rate if narrow-leaf hawk's-beard is between 3 and 6 inches (8 to 15 cm) in height.

Roundup Transorb - In Roundup Ready canola, apply 0.5 L/acre at the 0 to 6 leaf stage.

Pasture Sage

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.2 L/acre to the foliage of actively growing plants.

Banvel II - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.86 L/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds.

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Perennial Smartweed

Glyphosate - Apply 2.0 L/acre in 10 gallons/acre water. Apply when vines are a minimum of 8 inches (20 cm) tall, but before flowering.

Poplar

Glyphosate - As a non-selective spot treatment, apply 1.21 to 2.43 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in the summer through early fall when brush is actively growing.

Remedy EC - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

DyCleer + 2,4-D - In grass pasture and rangeland only, apply DyCleer at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4-D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

Poverty Weed

Banvel II - As a spot treatment apply 1.86 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water when weed is actively growing. Banvel II at 0.61 L/acre will provide only top growth control.

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 1.86 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Prairie Everlasting, Prairie Sage

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing plants in the early fall, and repeat in the spring.

Purple Loosestrife

(dryland situations only)

Roundup Transorb - Apply 2.43 L/acre in 30 to 60 gallons/acre (135 to 270 L/acre) water when purple loosestrife is actively growing and at or beyond the bloom stage. If using hand held equipment, apply a 1 to 2 percent solution until plants are wet. Use a 33 percent product solution if using a wiper applicator. Do not treat plants over open water. If possible, remove and destroy the flower heads before treatment to ensure prevention of seed set. For large monocultures of purple loosestrife, gradually work from the periphery inward over a number of years to allow competing vegetation to invade the treated area. Sprayed areas should be monitored for new seedlings to prevent re-infestation of purple loosestrife.

Red Bartsia

2,4-D amine or LV ester - Apply 0.57 L/acre of formulations containing 500 g/L 2,4-D in 10 gallons/acre (45 L/acre) water. On hayland, treat within 10 days after first cutting. Roadsides and pastures should be sprayed as soon as the red bartsia appears, usually in early July. Repeat treatment if necessary for later germination.

Roses

Banvel II + 2,4-D amine or LV ester (500 g/L) - In grass pastures, rangeland and non-crop land, apply Banvel II at 1.48 L/acre with 2,4-D LV ester or amine at 1.78 L/acre to the foliage of actively growing brush in the spring or early summer.

Escort - In pasture and rangeland, apply Escort at 0.012 kg/acre with non - ionic surfactant at 0.2 L per 100 L spray solution in 10 to 20 gallons/acre (45 to 90 L/acre) water. Apply between mid-June and mid-August after the brush has leafed out, but before the leaves begin to turn their fall colours.

Remedy EC - In grass pasture and rangeland, apply 1.62 to 3.24 L/acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

DyCleer + 2,4-D - In grass pasture and rangeland only, apply DyCleer at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4-D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

Russian Knapweed

Tordon 22K - In rangeland and grass pasture, apply 1.82 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

DyCleer - In grass pasture and rangeland only, apply 3.72 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Saskatoon

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

Scentless Chamomile

Ally plus 2,4-D - Apply 3 g/acre Ally plus 0.34 to 0.45 L/acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons/acre (45 L/acre) water for control of scentless chamomile in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Banvel II - Apply 0.51 L/acre Banvel II in 10 to 20 gallons/acre (45 to 90 L/acre) water to actively growing weeds for top growth control.

Buctril M - Apply 0.405 L/acre Buctril M when scentless chamomile is in the 2 to 4 leaf stage.

Curtail M - In registered crops, apply 0.81 L/acre in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

DyCleer - In grass pasture and rangeland only, apply 0.5 L/acre in 20 to 30 gallons (90 to 135 L) per acre when leaves are fully expanded.

Escort - In pastures, rangeland and rough turf, apply 8 g/acre in 10 to 20 gallons/acre (45 to 90 L / acre) of water to actively growing plants of less than 4 inches (10 cm) tall. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Liberty - In registered crops, apply 1.1 L/acre to plants up to 4 inches (10 cm) in height.

Lontrel - In registered crops, apply 0.23 L/acre in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

Prevail - In registered crops, apply at a rate of 20 acres per case in 10 gallons/acre (45 L/acre) water when scentless chamomile is actively growing and in the 2 to 4 leaf stage.

Refine Extra - Apply 8 g/acre in 10 gallons/acre (45 L/acre) water to actively growing seedlings for suppression. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Tordon 22K - In rangeland and grass pasture, apply 0.445 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Stinging Nettle

2,4-D amine - Apply 0.91 to 1.82 L/acre of formulations containing 500 g/L 2,4-D amine.

Stork's Bill

Linuron - Apply with MCPA amine in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

Ally Toss-N-Go - Apply with 2,4-D or MCPA amine or LV ester in registered crops at registered rates to stork's-bill in the 2 to 4 leaf stage.

Attain - Apply at a rate of 40 acres per case to registered crops when stork's-bill is in the 1 to 8 leaf stage.

Dichlorprop + 2,4-D - Apply at 0.71 L/acre to registered crops when stork's-bill is in the 2 to 4 leaf stage.

Liberty - in registered crops apply 1.35 L/acre to plants in 1 to 3 leaf stage.

Prestige - Apply at the rate of one case per 20 acres to registered crops when stork's-bill is in the 1 to 8 leaf stage.

Roundup Transorb - in Roundup Ready canola, apply 0.5 L/acre in the 0 to 6 leaf stage.

Toadflax

Ally plus 2,4-D - Apply 2 to 3 g/acre Ally plus 0.34 to 0.45 L/acre 2,4-D LV ester or amine (500 g/L formulations) in 10 gallons/acre (45 L/acre) water for toadflax suppression in wheat, barley, and creeping red fescue. Add non-ionic surfactant at 0.2 L per 100 L of spray solution.

Amitrol 240 - Apply 7.6 to 11.3 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in non-cropped areas and pastures when the weed is in the advanced rosette to prebud stage.

Dichlorprop + 2,4-D - Apply 0.71 L/acre in 10 to 18 gallons/acre (45 to 80 L/acre) water in wheat or barley for toadflax suppression. Apply when majority of toadflax is no taller than 6 inches (15 cm). The use of Dichlorprop + 2,4-D for suppression of toadflax in wheat or barley should be part of a long-term planned approach for toadflax control, which includes spring and fall tillage, fall patch spraying, summerfallow or chemical fallow.

Glyphosate - Apply 2.83 to 4.86 L/acre when most plants have reached the early bud stage of growth. Allow 7 more days after application before tillage. A rate of 1.0 L/acre may be used with preharvest applications or when controlling in summerfallow situations.

Tordon 22K - In rangeland and grass pasture, apply 3.6 L/acre in 90 to 180 gallons/acre (400 to 800 L/acre) of water to actively growing weeds. WARNING - Picloram is a very persistent and water-soluble herbicide. Do not apply to permeable soil. Do not apply to irrigated areas. Take special precautions to prevent drift.

Refine Extra - In registered crops, apply 8 g/acre in 10 gallons/acre (45 L/acre) water for suppression of toadflax. Apply when toadflax is less than 15 cm (6 inches) in height. Add non-ionic surfactant at 0.2 L per 100 L spray solution.

Western Snowberry (Buckbrush)

Banvel II plus 2,4-D LV ester (500 g/L) - Apply 1.48 L/acre Banvel II tank mixed with 1.82 L/acre 2,4-D LV Ester in 20 gallons/acre (90 L/acre) water in spring or early summer after the leaves are fully expanded.

2,4-D amine or LV ester (500 g/L) - Apply 1.82 L/acre 2,4-D amine or LV ester in a minimum of 20 gallons/acre (90 L/acre) water in spring or early summer. Retreatment may be necessary the following year.

DyCleer + 2,4-D - In grass pasture and rangeland only, apply DyCleer at 2.1 L plus 2,4-D 500 amine at 4 L or 2,4-D 600 ester at 3.3 L per 220 gallons (1000 L) of water and apply by wand to the point of runoff when leaves are fully expanded.

Escort - Apply 10 g/acre in 10 to 20 gallons/acre (45 to 90 L/acre) water between mid-June and mid-August after the brush has leafed out, but before the leaves turn their fall colours.

White Cockle

Mecoprop - Apply 2.2 L/acre in 18 gallons water/acre (*80 L/acre) for top growth control of established plants. Will also control seedlings. Apply to registered crops only.

2,4-DB - Apply Embutox 625 at 1.1 L/acre or Caliber 400 at 1.7 L/acre or Cobutox 600 at 1.1 L/acre for top growth control to registered crops only.

Wolf Willow (Silverwillow)

Banvel II + 2,4-D amine or LV ester (500 g/L) - In grass pastures with no legumes, apply Banvel II at 2.1 L per 1000 L of water with 2,4-D LV ester or amine at 4.0 L per 1000 L of water to the foliage of actively growing brush in the spring or early summer and wet the foliage until the point of runoff.

Wild Tomato

2,4-D or MCPA amine or ester (500 g/L) - Apply 0.34 to 0.45 L/acre to registered crops up to the 8 leaf stage of wild tomato.

Buctril M - Apply 0.40 L/acre to registered crops from the 1 to 6 leaf stage of wild tomato.

Willow

2,4-D LV ester - In grass pastures and non-crop land, apply 2,4-D LV ester (500 g/L) at 1.78 L/acre to the foliage of actively growing brush.

DyCleer + 2,4-D - In grass pasture and rangeland only, apply DyCleer at 1.7 L plus 2,4-D 500 amine at 3.24 L per acre in 20 to 30 gallons (90 to 135 L)of water per acre when leaves are fully expanded.

Glyphosate - As a non-selective spot treatment, apply 1.21 to 2.43 L/acre in 10 to 30 gallons/acre (45 to 135 L/acre) water in the summer through early fall when brush is actively growing.

Remedy EC - In grass pasture and rangeland apply 1.62 to 3.24 L /acre in 45 gallons/acre (200 L/acre) of water in broadcast treatment to fully expanded, actively growing foliage. Single stem foliar and backpack methods are also available - See Remedy section for details.

Soil Residual Herbicides

When applied at recommended rates in a crop, most herbicide residues will disappear within a few weeks after application and impose no restriction on cropping options the next year. However, some herbicide residues do not degrade quickly, and can persist in the soil for months or years following application, thereby restricting the crops that can be grown in rotation. Herbicide residues in the soil are deactivated in various ways including:

- Break down by chemical reactions,
- Break down by soil microbes,
- Escape to the atmosphere as a gas (volatilization),
- Break down by light (photodegradation),
- Leaching,
- Binding to soil particles.

Herbicides often disappear from the environment by more than one of these mechanisms. Many herbicides considered to be non-residual are bound temporarily to soil particles while they are broken down gradually by either soil microbes or chemical reactions. The binding action insures that the herbicide is not available to the crop in quantities that will cause damage.

As a general rule, breakdown processes are favoured by warm, moist soil conditions. During the winter, when the ground is frozen, and in the summer when the soil is dry, herbicide degradation is reduced. The residual activity of certain herbicides is also affected by soil organic matter and soil pH. These soil factors are seldom uniform across a field. Herbicide carryover is aggravated by low levels of organic matter and is more likely to occur on eroded hilltops than in other parts of a field. The risk of herbicide carryover will also be greater in sprayer overlaps which are most common around headlands and slough margins.

Growers should be aware of the residual properties before applying any herbicide if they are to avoid cropping restrictions in following years. Knowledge of the limitations associated with herbicides that leave a soil residue, along with an accurate record of application (i.e. rates, locations) will serve to minimize rotational problems

Herbicides that leave a soil residue and are of particular concern in Western Canada are:

Recropping Restrictions for Residual Herbicides:

Figures listed are the number of cropping seasons before each crop can be grown ("1" means that the crop can be grown the year following application). Products that have preseeding restriction (in days) are listed in italics. A blank space means that there are no recommendations given on the product label and a field bioassay is recommended by many product manufacturers to determine if these crops are safe to plant. A field bioassay is a strip of test crop that is representative of field variation and should include an untreated area.

PRODUCT	Alfalfa	Barley	Canaryseed	Clearfield canola	Non-Clearfield canola	Fababeans	Field corn	Dry beans	Field peas	Flax	Forage grasses	Lentils	Mustard (yellow)	Oats	Potatoes	Rye	Soybeans	Sunflowers	Wheat (durum)	Wheat (spring)	Wheat (winter)
2,4-D*	1	*0d*	1	1	1		1	1	1	1	1	1		1		*0d*			1	*0d*	*0d*
Absolute				1															1	1	
Accent		1					1							1					1	1	
Accord		1		1	1					2*		2*			NR			1	0	0	
Ally (pH less than 7, Brown and Dark Brown soils)		1	4		2					2		3	4	1					1	1	
Ally (pH less than 7, other soils)		1	4		1					1		3	4	1					1	1	
Ally (pH 7 to 7.9, Brown and Dark Brown soils)		1	4		3					3		4	4	2					1	1	
Ally (pH 7 to 7.9, other soils)		1	4		2					3		4	4	1					1	1	
Amitrol		*1d*	1	*1d*	*1d*		*10d**	*10d**	*10d**	1		1	1	1			*6 d*	1	*1d*	*1d*	*1d*
Assert (Black and Grey Wooded soils)		1	2	1	1				1	1				2				1	1	1	
Assert (Brown and Dark Brown soils)		1	2	1	2				2	2				2				1	1	1	
Atrazine, Laddock*, Primextra II Magnum						1*	1		1*	1*											
Attain, Trophy	2	1	2	1	1	2	2	2	1	1	1	1	1	1	2	1	2	2	1	1	1
Avadex	0	0	0	0	0	1	1	1	0	0		1	0	2		1	1	1	0	0	0
Banvel II*		1		1*	1*		1	1*						1			1		0*	0*	1
Curtail M, Eclipse, Prevail, FlaxMax, Prestige	2	1	2	1	1	2	1	2	1	1	1	2	1	1		1	2	2	1	1	1
Edge			2								2			2					1*	1*	
Everest, K2 (Brown soils)		1		2	2			2											1	1	
Everest, K2 (Other soils)		2		1	1			1	1*										1	1	
Fortress		0	2	0	0					0	2		0	2					0	0	
Frontier							0*	0*													1
Frontline, Spectrum (F=Frontline only)		1		1	1				1(F)										1	1	1
Kerb	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Lontrel		1		1	1					1	1		1	1		1			1	1	
Muster, Muster Gold	2	1	2		2	2			2	1	2*	2	2	1					1	1	1
Odyssey	1			1					1										1	1	
PrePass·		*0d*		1	1				1	1		1	1	*0d*					*0d*	*0d*	*0d*
Prism		1				1*	1								1		1				0
Pursuit, Pursuit Ultra	1	1		0					0			1							2	1	
Reflex*							1	0									0			1	0
Sencor				2	2													2			
Sundance - organic matter less than 4% & pH more than 7				1															1	0	
Sundance - organic matter more than 4% & pH less than 7		1		1	1				1	1									1	0	
Trifluralin			2				1*				2	0	0	2		0	0	0	1*	0*	1*
Ultim		1					1														1
Unity - soil pH less than 6.5*		1	2		1				1	1			2	1					1	0	
Unity - soil pH 6.5 to 7.4*		1	2		2				2	1			2	1					1	0	
Unity - soil pH greater than 7.4*		1	2		2				2	2			3	1					1	0	

* The minimum recropping intervals are listed. These intervals may be longer than those listed depending on use rates, region, soil types, time of application and crop variety. Refer to product page for more information.

0 – Maybe seeded or reseeded in the year of application. No recropping restrictions.

1 – Next cropping season after application.

2 – Two cropping seasons after application.

NR – Not recommended.

Note: The recropping intervals listed may not be sufficient to prevent crop injury during periods of below average rainfall.

Effect of Rainfall on Herbicide Efficacy

Required Interval	Product
15 minutes	Reglone
30 minutes	Horizon
1 hour	Achieve, Achieve Extra Gold, Assure II, Buctril M/Mextrol, Gramoxone, Hoe-Grass, Horizon BTM, Poast Ultra, Puma^{120} Super, Select
2 hours	2,4-D LV Ester, Ally+2,4-D LV Ester, Atrazine (postemergent applications), Champion Plus, Fusion, Laser DF, MCPA Ester, Triumph Plus, Trophy, Venture
4 hours	Accent, Ally + 2,4-D Amine, Champion^{120} Extra, 2,4-D Amine, Harmony Total, Liberty, MCPA Amine, Muster, Muster Gold, Prism, Refine Extra, Stampede EDF, Ultim
6 hours	Accord, Assert, Avenge, Curtail M, Everest, Express Pack, Flaxmax Ultra, K2, MCPA-K, MCPA Sodium Salt, Prevail, Rustler, Sencor 75DF, Sencor 500
8 hours	Basagran, Laddock
No specific recommendation*	Absolute, Amitrol 240, Attain, Banvel II, Caliber, Cobutox, Compitox, Dichlorprop-D, DyVel, DyVel DS, Embutox, Escort, Estaprop, Frontline, Glyphosate, Linuron, Lontrel, Mecoprop, Odyssey, Pardner/Koril, PrePass, Pursuit, Spectrum, Target, Thumper, Tropotox Plus, Turboprop, Unity

* The products listed make no specific time recommendation on the label. The required rainfree period could be up to 8 hours. See the product page in the guide or consult the product label.

Note: The term "Rainfastness" refers to the time needed between application and rainfall to avoid significant reduction in efficacy. Rainfall shortly after application of most postemergent herbicides may reduce weed control. Effect will vary with product, the interval between spraying and rainfall and the intensity and duration of the rainfall. These guidelines are based on label information. Use the longest time interval on the component products when considering tank mixes.

Plant Disease Control

Integrated Plant Disease Management

Cereals

Cereal leaf diseases continue to hurt growers on two fronts: yield and quality. The fact sheet *Managing Cereal Leaf Diseases* outlines the best management practices to help growers manage cereal diseases and minimize the threat they pose to yield and quality. The following management practices are recommended for effective control of leaf diseases in all cereal crops, especially high-value barley and both spring and winter wheat.

Scouting: Scout fields prior to, during, and following flag leaf emergence to check for disease levels. Healthy flag and upper leaves are critical, since more than 50% of grain filling is contributed by upper leaves.

Crop Rotation: Rotate crops (e.g. wheat/oilseed/barley/pulse) to reduce the build-up of disease inoculum in crop residue. If at all possible, do not follow wheat with wheat or barley with barley. When a short rotation is absolutely necessary, seed in the second year a variety that is more resistant to an anticipated disease problem.

Clean Seed: Use certified seed and/or seed that has been treated with an appropriate fungicide to reduce the possibility of introducing seed-borne inoculum into a field.

Seed Treatments: Seed treatments together with quality seed help emerging crops by controlling most seed-borne disease and allowing the crop to get a good start (quicker, more uniform plant emergence and better seedling vigour). Seed treatments protect young plants against seedling diseases but do not prevent later infection by cereal leaf diseases.

Resistant Varieties: Provincial crop/seed guides provide a comprehensive listing of the performance of adapted cultivars, including their resistance status to specific diseases.

Foliar Fungicides: Foliar fungicides applied at the proper time in accordance with manufacturer's recommendations can control cereal leaf diseases and help to attain target yields.

Spraying Practices: For maximum effectiveness, foliar fungicides should be applied preventively (when infection levels are low). Good spray coverage with minimal drift is essential. Ideally, the best time to spray is when the wind is light; humidity is above 60%; and air temperature is between 10 and 25°C.

Fusarium Head Blight

Fusarium head blight (FHB) of cereals causes a reduction in yield as a result of floret sterility and the loss of light weight kernels during combining. More important is the effect on grain quality and food safety. In Manitoba, FHB currently occurs throughout all crop regions and will damage wheat crops whenever environment conditions favour the disease. In Saskatchewan, FHB is established in the southeast but has occurred in some areas throughout the province.

For FHB to occur, three requirements must be met: the disease causing fungus must be present, a susceptible host grown, and environmental conditions favorable for infection and disease development. If any one of these factors is missing disease cannot occur; the severity of disease in the field is a result of the interaction of the above factors.

Field Management to Prevent Recurrence

Weather patterns are by far the greatest factor in the recurrence of FHB. The disease is most likely to develop when the plants are flowering, temperatures range from 15 to 30°C and moisture is continuous for 48 to 60 hours. If conditions remain warm and moist, the pathogen can continue to sporulate and spread to other kernels or heads. Under these optimum conditions, crop management has little impact on FHB outbreaks.

Crop Rotation and Selection

A break of at least one year – preferably two years – is advised between cereal, grass and corn production.

Regardless of the rotation, producers should consider planting cereals that are less susceptible to FHB. Results from previous years show that durum wheat is more susceptible than hard red spring wheat varieties. Barley is more tolerant than wheat, and oats are more tolerant than either wheat or barley.

Avoid planting the more susceptible types of wheat in high risk areas such as the southern part of the Red River Valley and southeastern Saskatchewan. Planting two or more varieties of wheat will spread out flowering times and reduce the risk of infection. Planting dates should be staggered within the recommended planting period to vary the flowering dates and reduce disease severity.

Susceptible crops should definitely not be planted on infected corn stubble. Corn trash is slower to decompose than cereal trash, and acts as a source of inoculum for a much longer time period. In fields of wheat on wheat stubble, the incidence was about one and a half times higher than in fields of wheat planted into pulse crop residue.

A forecast risk of occurrence of FHB in wheat during the growing season was conducted by Manitoba Agriculture and Food and the Agrometeorological Centre of Excellence (ACE) with support from Bayer CropScience in 2002. This information appears on the ACE website:
www.aceweather.ca under Maps and Interpretations.

Potatoes

One of the major threats to Manitoba's and Saskatchewan's potato industry is the fungal disease late blight. At present, there are no fungicides registered for use on potatoes that are capable of eradicating the fungus once it is present. As a result, producers are forced to adopt preventive management to control this disease. One of the main components of this strategy is the application of fungicides at specified spray intervals. This interval varies with the type of fungicide used. Shortening or lengthening of this interval should be based on current weather conditions and the status of the disease in the crop.

Manitoba Agriculture and Food, in association with the Agrometeorological Centre of Excellence; and Saskatchewan Agriculture and Food, in association with the Saskatchewan Seed Potato Growers Association, have initiated a weather monitoring program in the potato producing regions. The purpose of this program is to predict when environmental conditions are most conducive to disease development and issue warnings based on those predictions. Accurate weather monitoring and scouting techniques are very important for achieving the most effective use of fungicides. Combining precise weather monitoring with spray interval scheduling may lower input costs for the farmer and lead to a more productive, higher quality crop. These weather monitoring systems monitor key environmental variables, such as relative humidity, temperature, leaf wetness and precipitation. Risk forecast maps and interpretation appear on the Agrometeorological Centre of Excellence (ACE) website at: www.aceweather.ca.

The following management practices are recommended for effective control of late blight in potato crops.

Scouting: To effectively schedule preventative fungicide applications and eliminate unnecessary fungicide use, local weather forecasts should be used to identify conditions conducive to disease development. Scout fields to identify hot spots and other sources of disease when conditions are favourable.

Crop Varieties and Resistant Cultivars: Select varieties with resistance to late blight wherever possible. Where practical, the use of short season varieties may help reduce the period of use for fungicides.

Healthy Seed: Obtain seed from sources with effective disease management practices. The use of certified seed is recommended. Grade seed carefully while cutting and discard suspicious looking tubers and seed pieces.

Sanitation and Cull Clean-up: Follow a program of sanitation for storage facilities and equipment to eliminate sources of the disease. Avoid leaving tubers, including debris or slivers from seed cutting, in cull piles for any length of time. Avoid uncovered cull piles during the growing season.

Cultural Practices and Rotation: Use proper cultural practices including: rotate potato crops with non-late blight hosts; use proper hilling to reduce infection in tubers; increase spacings of plants to reduce canopy density; manage irrigation use to avoid increasing disease risk during prolonged periods of wetness; identify and destroy hot spots of infected fields; control weed hosts and remove and destroy volunteer potatoes.

Canola

For the past 25 years, sclerotinia stem rot has been one of the two prominent diseases affecting canola in Manitoba and Saskatchewan. An important factor of disease development is environmental conditions. The disease is much more widespread and severe during wet years.

Fungicide applications are an important element in controlling the development and spread of sclerotinia. Fungicide spray decisions are based on soil moisture, weather conditions, crop stage and density, and the history of disease in your area.

The sclerotinia resting bodies require moist soil conditions for up to 10 days for germination to occur and the spore-bearing structures (apothecia) to form. Usually these conditions do not occur until the crop canopy closes. The spores released from the apothecia utilize the canola petals as a food source and fall into the canola canopy where they infect individual plants. Lesions form up and down the stem, wilting leaves and eventually killing the plant. Producers should check their fields prior to the flowering stage for the apothecia. Fungicide should be applied between the 20 to 50% flower stage to protect the petals from being colonized by the spores.

A forecast of the risk of occurrence of sclerotinia of canola during the blossom period was conducted by Manitoba Agriculture and Food and the Agrometeorological Centre of Excellence (ACE) with support from Bayer CropScience and the Manitoba Canola Growers Association in 2002. Risk maps for each province in the prairie region are produced twice weekly from mid-June to the end of July.
This information appears on the ACE website:
www.aceweather.ca under Maps and Interpretations.

Resistance Management

Any fungal pathogen population may contain strains naturally resistant to a fungicide and other fungicides within the same group. A gradual or total loss of disease control may occur over time if these fungicides are used repeatedly in the same fields. Other resistance mechanisms that are not linked to site of action but specific for individual chemicals, such as enhanced metabolism, may also exist. Appropriate resistance management strategies should be followed.

To delay fungicide resistance:

- Where possible, rotate the use of a fungicide, and others within the same Group, with different Groups that control the same pathogens.
- Avoid application of more than the maximum number listed in the label. Also avoid consecutive sprays of a fungicide, or other fungicides in the same Group, in a season.
- Fungicide use should be based on an integrated pest management (IPM) program that includes scouting and accurate recording related to pesticide use and crop rotation. An IPM program also considers cultural, biological and other chemical control practices.
- Monitor treated fungal populations for signs of resistance development. If disease continues to progress after treatment with a product, do not increase the use rate. Discontinue use of the product and switch to another fungicide with a different target site of action, if available.
- Contact your local extension specialist or certified crop advisors for any additional pesticide resistance-management and/or IPM recommendations for specific crops and disease problems in your area.

Table 1: Fungicide Groups Based on Mode of Action

Group	Chemical Group/ Mode of Action	Foliar Fungicide Common Name	Seed Treatment Common Name
1	MBC/ inhibition of tubulin formation	Benlate, Senator	Crown*, DCT*, Mertect SC, Senator PSPT
2	Dicarboximides/ affect cell division, DNA/RNA synthesis and metabolism	Ronilan, Rovral	Foundation Lite *
3	DMI/ inhibition of sterol biosynthesis	Folicur, Tilt	Baytan 30, Charter, Dividend XL RTA*, Helix*, Helix XTra*, Raxil FL, Raxil 250 FL
4	PA/ affect RNA synthesis	Ridomil Gold/Bravo*	Apron FL, Allegiance FL, Dividend XL RTA*, Helix*, Helix XTra*
7	Carboximides/ affect mitochondrial transport	None	Crown*, Gaucho CS FL*, Vitaflo 280*, Vitavax Dual Powder*, Vitavax Dual Solution*, Vitaflo Dual Purpose*, Vitavax Powder*, Vitavax rs Fungicide*, Vitavax Single Solution
11	QoI/ inhibition of mitochondrial respiration	Quadris	None
12	PP/ affect proteins involved in membrane permeability	None	Helix*, Helix XTra*, Maxim PSP
15	Cinnamic acids/ affect cell wall synthesis	Acrobat MZ*	None
22	Benzamide/ inhibition of tubulin formation	Gavel*	None
27	Cyanoacetamideoximes/ unknown	Curzate	None

Group	Chemical Group/ Mode of Action	Foliar Fungicide Common Name	Seed Treatment Common Name
28	Carbamates/ affect cell membrane permeability	Tattoo*	None
M	Multi-site activity	Acrobat MZ*, Bravo, Copper-based Fungicides, Dithane, Gavel*, Manzate, Penncozeb, Polyram DF, Ridomil Gold/ Bravo*, Tattoo*	Agrox D-L Plus, Agrox B-2, Agrox B-3, Agrox CD, Captan, DB-Green L, DB-Red L, DCT*, Dithane F-45, DLC, Foundation Lite*, Gaucho CS FL*, N-M Drill Box, N-M Dual Purpose, Polyram 16D, Potato ST16, MancoPlus, Tuberseal, Thiram 75WP, Vitaflo 280*, Vitavax Dual Powder*, Vitavax Dual Solution*, Vitaflo Dual Purpose*, Vitavax Powder*, Vitavax rs Fungicide*

* Products contain more than one active ingredient and appear in more than one group.

MBC = **M**ethyl **B**enzimidazole **C**arbamates
DMI = Demethylation Inhibitors (SBI Class I)
PA = **P**henyl **A**mides
QoI = **Q**uinone **o**utside **I**nhibitors
PP = **P**henyl **P**yrroles
SBI = **S**terol **B**iosynthesis **I**nhibitors

Foliar Fungicide Directory

Table 2. Foliar-applied Fungicides in Field Crops

FUNGICIDES	Page	Alfalfa (for seed only)	Barley	Beans (Field)	Canaryseed	Canola	Lentils, Chickpeas	Oats	Peas (Field)	Potatoes	Wheat	Anthracnose, Ascochyta (Lentils), Ascochyta (chickpeas, peas)	Bacterial Blight (Beans)	Blackleg (Canola)	Botrytis/Gray Mould (Beans, Alfalfa)	Botrytis/Gray Mould (Potatoes)	Crown Rust (Oats)	Downy Mildew, Anthracnose (Beans)	Early Blight, Late Blight (Potatoes)	Leaf Rust, Stem Rust, Net Blotch, Scald (Barley)	Leaf Rust, Stem Rust (Wheat)	Powdery Mildew (Wheat, Barley, Peas)	Sclerotinia	Septoria (Wheat, Barley, Oats, Canaryseed)	Tan Spot (Wheat)	Fusarium Head Blight (Wheat)	Alternaria Blackspot (Canola)
Acrobat MZ	236									✓									•								
Benlate	237	X		X		X									•								•				
Bravo 500	238						X		X	✓	X	•				•			•					⑤	•	⑩	
Clean Crop Copper 53W	239			X						X			•					•	•								
Clean Crop Copper Spray	239									✓									•								
Curzate 60DF	241									✓									⑧								
Dithane DG Rainshield NT	242	X					X			✓	X	④			①				•		⑨			⑥	•		
Gavel 75 DF	244									✓									•								
Kocide 101	239			X						✓			•						•								
Kocide DF	239									✓									•								
Kumulus DF	245								X													⑤					
Manzate 200-DF	242									✓	X								•		⑨			⑤	•		
Parasol Flowable	239									✓									•								
Parasol WP	239			X						✓			•						•								
Penncozeb 75 DF	242									✓	X								•		⑨			⑤	•		
Polyram DF	246									✓									•								
Quadris	247					X								•									•				•
Ridomil Gold/Bravo	248									✓						•			•								
Ronilan EG	249			X		X									②								•				
Rovral Flo	250					X																	③				•
Senator 70 WP	251			X																			②				
Tattoo C	251									✓									⑧								
Tilt 250 EC	252		X		X	X		X			X			•			•			•	•	⑦		•	•		

① alfalfa only
② beans only
③ canola only
④ lentils only
⑤ peas only
⑥ wheat only
⑦ wheat, barley only
⑧ late blight only
⑨ leaf rust only
⑩ suppression only
✓ products approved for use in potatoes by Midwest Foods Products Inc. and McCain Foods (Canada)

Acrobat MZ

Fungicide Group – 15, M
(Refer to page 233)

Company:

BASF Canada

Formulation:

9% dimethomorph and 60%mancozeb formulated as a wettable powder.

Container size - 10 kg.

Crops:

Potatoes.

Diseases Controlled:

Early and late blight. Reduction of tuber blight.

Crop Stage:

Make the first application when the disease threatens or when the first visible signs of disease occur in the field or nearby. Apply every 5 to 7 days under high disease pressure or every 7 to 10 days under low disease pressure. Do not apply more than 3 times per season. It is recommended to apply this product alternately with a fungicide having a different mode of action. Under high level of late blight infection, apply after top kill to control tuber blight.

How it Works:

Acrobat MZ has protectant, systemic and antisporulant activity. The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity. The active ingredient dimethomorph penetrates into the leaf tissue and moves within the leaf.

Cost (2002 suggested retail price):

$38.50/acre

Rate:

Apply at 1.0 kg per acre.

Water Volume:

Use sufficient water to obtain adequate spray coverage.

Ground - 18 gallons/acre (80 L/acre).

Aerial - minimum 5 gallons/acre (20 L/acre).

Restrictions:

Rainfall: Do not apply when rain is expected within 2 - 3 hours. Apply to dry foliage.

Preharvest Interval: 14 days.

Recropping: Do not replant in treated area within 120 days of last application.

Environment: Do not apply to terrain where there is a potential for surface runoff to enter aquatic systems. This product is highly toxic to aquatic organisms. Do not apply within 100 m of streams, ponds, rivers and lakes when applying by air and within 50 m when applying by ground.

Storage: Store under cool, dry conditions in secure, well ventilated buildings away from food or feed.

Resistance: Plant diseases can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecast and recommendations.

Hazard Rating:

Caution: Potential skin sensitizer.

Benlate/Benlate Toss-N-Go

Fungicide Group – 1
(Refer to page 233)

Company:

DuPont Canada Inc.

Formulation:

50% benomyl formulated as a wettable powder.

Container sizes -
Benlate - 10 kg
Benlate Toss-N-Go - 10 kg (1 kg water soluble bag, 5 x 1 kg per pouch, 2 x 5 kg pouch per case).

Crops:

Canola, field beans, seed alfalfa.

Diseases Controlled:

Sclerotinia stem rot in canola.

Sclerotinia and Botrytis (grey mould) in field, dry (white) and snap common beans and alfalfa grown for seed.

Crop Stage:

Canola - Can be applied up to the 50% bloom stage. Optimum protection is from 20 to 30% bloom stage, which is before the first petals begin to fall and where there is maximum number of petals and buds that can be covered by the spray.

Beans - Apply between the stage when 50% of all plants have one open flower and full bloom.

Alfalfa - Apply at early bloom through to full bloom. Do not make more than two applications per year.

How it Works:

The active ingredient benomyl is a benzimidazole fungicide with systemic, curative and contact activity.

Cost (2001 suggested retail prices):

- no longer manufactured

$15.90 to $21.15/acre for canola

$37.10 to $47.70/acre for beans

$31.80/acre for alfalfa

Rate:

Canola - 0.3 to 0.4 kg/acre (one 10 kg container treats 33 to 25 acres). Use the high rate for application after 30% bloom, or under severe prolonged disease conditions (i.e. heavy crop canopy, high humidity, and/or excessive moisture).

Beans - 0.7 to 0.9 kg/acre (one 10 kg container treats 14 to 11 acres).

Alfalfa - 0.6 kg/acre (one 10 kg container treats 17 acres).

Water Volume:

Beans, alfalfa - Ground - 10 to 20 gallons/acre (40 to 80 L/acre).
Air - 3 gallons/acre (14 L/acre).

Canola - Ground - minimum 7 to 9 gallons/acre (32 to 40 L/acre).
Air - minimum 3.6 gallons/acre (16 L/acre).

Nozzles:

Hollow cone or flat fan for ground and properly calibrated aerial equipment.

Effects of Weather:

Rainfast within 1 to 2 hours of application. Do not irrigate within 6 hours of application.

Registered Mixes:

Do not mix with alkaline pesticides such as basic copper sulphate. Do not tank mix or alternate with thiophanate products (Senator).

Restrictions:

Grazing: Do not graze or feed treated hay to livestock.

Preharvest Interval: 14 days.

Storage: Do not allow product to become wet during storage. Keep away from fires or sparks.

Resistance: Resistance to benomyl has been found in Sclerotinia on canola in the Prairie region. Avoid the repeated or consecutive use of one fungicide in successive years when alternative products are available.

Hazard Rating:

None.

Acrobat MZ

Fungicide Group – 15, M
(Refer to page 233)

Company:

BASF Canada

Formulation:

9% dimethomorph and 60% mancozeb formulated as a wettable powder.

Container size - 10 kg.

Crops:

Potatoes.

Diseases Controlled:

Early and late blight. Reduction of tuber blight.

Crop Stage:

Make the first application when the disease threatens or when the first visible signs of disease occur in the field or nearby. Apply every 5 to 7 days under high disease pressure or every 7 to 10 days under low disease pressure. Do not apply more than 3 times per season. It is recommended to apply this product alternately with a fungicide having a different mode of action. Under high level of late blight infection, apply after top kill to control tuber blight.

How it Works:

Acrobat MZ has protectant, systemic and antisporulant activity. The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity. The active ingredient dimethomorph penetrates into the leaf tissue and moves within the leaf.

Cost (2002 suggested retail price):

$38.50/acre

Rate:

Apply at 1.0 kg per acre.

Water Volume:

Use sufficient water to obtain adequate spray coverage.

Ground - 18 gallons/acre (80 L/acre).

Aerial - minimum 5 gallons/acre (20 L/acre).

Restrictions:

Rainfall: Do not apply when rain is expected within 2 - 3 hours. Apply to dry foliage.

Preharvest Interval: 14 days.

Recropping: Do not replant in treated area within 120 days of last application.

Environment: Do not apply to terrain where there is a potential for surface runoff to enter aquatic systems. This product is highly toxic to aquatic organisms. Do not apply within 100 m of streams, ponds, rivers and lakes when applying by air and within 50 m when applying by ground.

Storage: Store under cool, dry conditions in secure, well ventilated buildings away from food or feed.

Resistance: Plant diseases can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecast and recommendations.

Hazard Rating:

Caution: Potential skin sensitizer.

Benlate/Benlate Toss-N-Go

Fungicide Group – 1
(Refer to page 233)

Company:

DuPont Canada Inc.

Formulation:

50% benomyl formulated as a wettable powder.

Container sizes -
Benlate - 10 kg
Benlate Toss-N-Go - 10 kg (1 kg water soluble bag, 5 x 1 kg per pouch, 2 x 5 kg pouch per case).

Crops:

Canola, field beans, seed alfalfa.

Diseases Controlled:

Sclerotinia stem rot in canola.

Sclerotinia and Botrytis (grey mould) in field, dry (white) and snap common beans and alfalfa grown for seed.

Crop Stage:

Canola - Can be applied up to the 50% bloom stage. Optimum protection is from 20 to 30% bloom stage, which is before the first petals begin to fall and where there is maximum number of petals and buds that can be covered by the spray.

Beans - Apply between the stage when 50% of all plants have one open flower and full bloom.

Alfalfa - Apply at early bloom through to full bloom. Do not make more than two applications per year.

How it Works:

The active ingredient benomyl is a benzimidazole fungicide with systemic, curative and contact activity.

Cost (2001 suggested retail prices):

- no longer manufactured
$15.90 to $21.15/acre for canola
$37.10 to $47.70/acre for beans
$31.80/acre for alfalfa

Rate:

Canola - 0.3 to 0.4 kg/acre (one 10 kg container treats 33 to 25 acres). Use the high rate for application after 30% bloom, or under severe prolonged disease conditions (i.e. heavy crop canopy, high humidity, and/or excessive moisture).

Beans - 0.7 to 0.9 kg/acre (one 10 kg container treats 14 to 11 acres).

Alfalfa - 0.6 kg/acre (one 10 kg container treats 17 acres).

Water Volume:

Beans, alfalfa - Ground - 10 to 20 gallons/acre (40 to 80 L/acre).
Air - 3 gallons/acre (14 L/acre).

Canola - Ground - minimum 7 to 9 gallons/acre (32 to 40 L/acre).
Air - minimum 3.6 gallons/acre (16 L/acre).

Nozzles:

Hollow cone or flat fan for ground and properly calibrated aerial equipment.

Effects of Weather:

Rainfast within 1 to 2 hours of application. Do not irrigate within 6 hours of application.

Registered Mixes:

Do not mix with alkaline pesticides such as basic copper sulphate. Do not tank mix or alternate with thiophanate products (Senator).

Restrictions:

Grazing: Do not graze or feed treated hay to livestock.

Preharvest Interval: 14 days.

Storage: Do not allow product to become wet during storage. Keep away from fires or sparks.

Resistance: Resistance to benomyl has been found in Sclerotinia on canola in the Prairie region. Avoid the repeated or consecutive use of one fungicide in successive years when alternative products are available.

Hazard Rating:

None.

Bravo 500

Fungicide Group – M
(Refer to page 233)

Company:
Syngenta

Formulation:
500 g/L chlorothalonil formulated as a suspension.
Container sizes - 2 x 10 L case, 200 L drum.

Crops:
Wheat (all wheat including durum & winter wheat), potatoes, lentils, chickpeas and field peas.

Diseases Controlled:
Wheat - Tan Spot, Septoria Glume Blotch, Septoria Leaf Spot. Suppression of Fusarium Head Blight (Scab).

Potatoes - Early and late blight, Botrytis vine rot.

Lentils - Anthracnose and Ascochyta blight.

Chickpeas - Ascochyta blight

Peas - Ascochyta blight

Crop Stage:
Wheat - For control of Tan Spot and Septoria, begin application at flag leaf emergence and repeat 10 - 14 days later when ears are visible. A third application when ears are fully emerged may be necessary, if conditions favour disease spread. For suppression of Fusarium Head Blight apply Bravo at early flowering. For best results, this application must be made before flowering has started in the majority of tillers and before the beginning of weather favouring disease. Do not make more than 3 applications per season. Rates and number of applications will depend upon disease severity and weather conditions.

Potatoes - Begin application when plants are 6 to 8 inches (15 to 20 cm) high or when disease threatens. Repeat applications at 7 to 10-day intervals or as necessary to maintain disease control. Under severe disease conditions use the higher rates at 7-day intervals.

Lentils - One application, must occur at early flowering.

Two applications - first application before flowering when bud formation is evident. Second application must occur at early to mid-flowering, 10 to 14 days after the first application, but before rows close in to form a dense canopy.

Rates and number of applications will depend upon disease severity and weather conditions.

Chickpeas - Make first application at early flowering and remaining applications at 10-day intervals. Do not make more than 3 applications per season. Rate and number of applications will depend upon disease severity and weather conditions.

Peas - Begin application at early flowering and repeat 10 days later at early pod set or mid-flowering if necessary. Make a third application 10 - 14 days after the second application at pod fill or later flowering should conditions remain favourable for disease. Do not make more than 3 applications per season. Rates and the number of applications will depend upon disease severity and weather conditions.

How it Works:
The active ingredient chlorothalonil is a chloronitrile fungicide with contact activity.

Cost (2002 suggested retail prices):
$8.59 to $14.32/acre for wheat.
$6.87 to $14.32/acre for potatoes.
$11.46 to $22.91/acre for lentils.
$11.46 to $22.91/acre for chickpeas.
$11.46 to $17.18/acre for peas.

Rate:
Wheat - 0.6 L to 1 L/acre for the control of Tan Spot and Septoria.

0.8 L to 1 L/acre for the suppression of Fusarium Head Blight.

Potatoes - 0.48 to 1 L/acre for control of late blight. 0.65 to 1 L/acre for control of early blight and botrytis stem rot.

Lentils - 0.8 to 1.6 L/acre.

Chickpeas - 1.2 to 1.6 L/acre for first application. 0.8 to 1.2 L/acre for subsequent applications.

Peas - 0.8 L to 1.2 L/acre for the control of Ascochyta blight.

Water Volume:
Volume will vary with amount of plant growth. Use sufficient water to obtain adequate spray coverage. Spray volume will usually range from 20 to 140 gallons/acre (90 to 640 L/acre) for dilute sprays and 4.4 to 8.8 gallons/acre (20 to 40 L/acre) for concentrate sprays.

Chickpeas - 20 gallons/acre (90 L/acre). Ground application only.

Registered Mixes:

Do not combine with pesticides, surfactants or fertilizers unless prior use has shown the combination physically compatible and non-injurious under your conditions of use. On lentils, do not apply in combination with POAST herbicide and MERGE surfactant or within 48 hours of the application of POAST and MERGE.

Restrictions:

Grazing: Do not graze treated areas. Do not feed straw from treated crop to livestock.

Preharvest Interval: Potato - 1 day.
Lentils and chickpeas - 48 days.
Wheat - 30 days.
Peas - 32 days.

Recropping: None.

Application: On lentils do not make more than 2 applications in the same season. On chickpeas, wheat and peas, do not make more than 3 applications per season. Do not apply by air for chickpeas.

Storage: Store in a cool, dry, ventilated place. Protect from excessive heat.

Environment: Do not apply if weather conditions favour drift from area being treated. Do not contaminate lakes, streams or ponds. Allow a buffer zone of 15 m between area being treated and aquatic systems for ground applications and a buffer zone of 100 m for aerial application.

Re-entry: Do not re-enter treated area within 48 hours. If required, and at least 4 hours have passed since application, individuals may re-enter treated area for short-term tasks not involving hand labour. Long pants, long-sleeved shirt, and chemical resistant gloves must be worn.

Hazard Rating:

Warning, causes severe eye damage.

Copper-based Fungicides

Clean Crop Copper 53W/Clean Crop Copper Spray/ Kocide 101/Kocide DF/Parasol WP/Parasol Flowable

Fungicide Group – M

(Refer to page 233)

Company:

United Agri Products, (Clean Crop Copper 53W, Clean Crop Copper Spray)

Griffin, distributed by United Agri Products (Kocide)

Agtrol International, distributed by United Agri Products (Parasol Flowable)

Agtrol International, distributed by United Agri Products and Van Waters and Rogers (Parasol WP)

Formulation:

Clean Crop Copper 53 W - 53% tribasic copper sulphate formulated as a wettable powder.
Container size - 10 kg.

Clean Crop Copper Spray - 50% copper oxychloride formulated as a wettable powder.
Container size - 10 x 2 kg case.

Kocide 101 - 50% copper as copper hydroxide formulated as a wettable powder.
Container size - 5 kg.

Kocide DF - 40% copper as copper hydroxide formulated as a dry flowable.
Container size - 10 kg.

Parasol WP - 50% copper equivalent as copper hydroxide formulated as a wettable powder.
Container size - 10 kg.

Parasol Flowable - 24.4% copper equivalent as copper hydroxide formulated as a flowable.
Container size - 10L.

Crops:

Potatoes, beans.

Diseases Controlled:

PRODUCT	POTATO	BEAN
Clean Crop Copper 53W	Early and late blight	Anthracnose Downy Mildew Bacterial Blight
Clean Crop Copper spray	Early and late blight	
Kocide 101	Early and late blight	Bacterial blight (bacterial and halo)
Kocide DF	Early and late blight	
Parasol WP	Early and late blight	Bacterial blight (bacterial and halo)
Parasol Flowable	Early and late blight	

Crop Stage:

Potatoes - (Clean Crop Copper 53W, Clean Crop Copper Spray) - Apply when plants are 5 to 7 inches (12 to 18 cm) tall. Repeat at 7 to 10 day intervals.

(Kocide 101, Kocide DF, Parasol WP, Parasol Flowable) - Apply when plants are 6 inches (15 cm) tall. Apply combined with 0.7 to 0.9 kg of a mancozeb (80%) product pe acre, at 7 to 10 day intervals. Kocide and Parasol may b applied with a desiccant at vine kill or alone after vine kill prior to harvest, to reduce the risk of late blight tuber infection. See table for rates.

Beans - First application when plants are 6 inches (15 cm tall, as a protectant. Repeat every 7 to 14 days dependin on local conditions.

How it Works:

The active ingredients tribasic copper sulphate, coppe oxychloride and copper hydroxide are inorganic fungicides with contact activity.

Cost:

Clean Crop Copper 53W - $11.50/kg
Clean Crop Copper Spray - $12.20/kg
Kocide 101 - $11.23/kg
Kocide DF - $12.00/kg
(2001 suggested retail prices)

Parasol WP - $9.90/kg
Parasol Flowable - $14.25/L
(2002 suggested retail price)

Rates:

Product	Potato (kg/acre)	Acres treated by 1 container	Beans (kg/acre)	Acres treated by 1 container
Clean Crop Copper 53W	2.2	4.5	2.2	4.5
Clean Crop Copper Spray	1.6	6.25		
Kocide 101	0.44 - 0.9 1.38 (vine kill)	11.4 - 5.5 3.7 (vine kill)	0.9 - 1.3	5.5 - 3.8
Kocide DF	0.44 - 0.69 1.38 (vine kill)	23 - 14.5 7.3 (vine kill)		
Parasol WP	0.44 - 1.0 1.36 (vine kill)	23 - 10 7.3 (vine kill)	0.9 - 1.3	11 - 7.7
Parasol Flowable	0.32 - 0.72 L/ acre 1 L/ acre (vine kill)	31.2 - 13.9 10 (vine kill)		

Water Volumes:

Kocide 101, DF - Enough to ensure thorough coverage. Check label.

Clean Crop Copper 53W and Copper Spray - 88 gallons/acre (400 L/acre).

Parasol WP, Parasol Flowable - Enough to ensure thorough coverage.

Restrictions:

Storage: Store in cool, dry, ventilated area, away from feed or food. Keep away from heat, fire and sparks.

Preharvest Interval: 1 day.

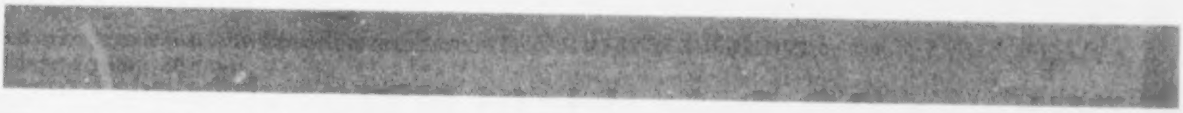
Environment: Do not apply or allow to drift onto streams or any body of water.

Hazard Rating:

◈ Warning Poison (Copper 53W, Copper Spray)

▽ Caution Poison (Kocide 101, Parasol Flowable, Parasol WP)

⊛ Danger Poison (Kocide DF)



Curzate 60 DF

Fungicide Group – 27
(Refer to page 233)

Company

DuPont Canada Inc.

Formulation:

60% cymoxanil formulated as a dry flowable.

Container size - 1.8 kg

Crops:

Potatoes

Diseases Controlled:

Late blight *(Phytophthora infestans)*

Crop Stage:

Use Curzate 60 DF only in a tankmix with Manzate 200 DF. Do not use Curzate 60 DF alone.

Initial applications should start when local conditions indicate that late blight is imminent. Make additional applications at 5-7 day intervals. Apply no more than 7 applications per crop.

How it Works:

The active ingredient cymoxanil is a highly active, locally systemic fungicide. It works at several levels of preventative, curative and inhibitive (against sporulation) activity.

The active ingredient mancozeb in Manzate 200 DF is a dithiocarbamate fungicide with contact activity.

Cost (2002 suggested retail price):

$11.31/acre

Rate:

Apply Curzate 60 DF at 0.09 kg/acre

Plus

Manzate 200 DF at 0.65 kg/acre

Water Volume:

Utilize sufficient water to obtain thorough coverage: 20-100 gallons/acre (80-400 L / acre).

Restrictions:

Rainfall: Curzate is rainfast within 2 hours after application.

Re-entry: Do not re-enter treated area within 24 hours.

Preharvest Interval: 8 days

Application: Do not apply by air.

Storage: Store product in original container in a secure, dry area away from food or feed. Protect against humid air and water. Not for use or storage in or around the home. Keep container tightly closed.

Environment: A buffer zone of 50m is required between th down-wind edge of the boom and sensitive aquatic habitats such as ponds, lakes, rivers, streams, and wetlands. D not contaminate these habitats when cleaning and rinsin equipment or containers. Do not clean sprayer near well o water source or near desirable vegetation.

Hazard Rating:

Caution poison

Dithane DG Rainshield NT/ Manzate 200-DF/Penncozeb 75 DF

Fungicide Group – M

(Refer to page 233)

Company:

Dow AgroSciences (Dithane DG Rainshield NT)
DuPont Canada Inc. (Manzate 200-DF)
Cerexagri; distributed by United Agri Products (Penncozeb 75 DF)

Formulations:

Dithane DG Rainshield NT - 75% mancozeb formulated as a dispersible granule. Container size - 20 kg.

Manzate 200-DF - 75% mancozeb formulated as a dry flowable granule. Container sizes - 20 kg, 2.5 kg.

Penncozeb 75 DF - 75% mancozeb formulated as a dry flowable powder. Container sizes - 20 kg.

Crops:

Potatoes
Wheat
Lentils (Dithane DG Rainshield NT only)
Seed alfalfa (Dithane DG Rainshield NT only)

Diseases Controlled:

	DITHANE DG RAINSHIELD NT	MANZATE 200 DF PENNCOZEB 75 DF
Wheat	Tanspot, leaf rust, Septoria leaf blotch	Tanspot, leaf rust, Septoria leaf blotch
Lentils	Anthracnose and ascochyta blight	
Potatoes	Early and late blight	Early and late blight
Seed Alfalfa	Leaf spot and stem spot diseases	

Crop Stage:

Potatoes - Apply when plants are 4 to 6 inches (10 to 15 cm high; repeat at 7 to 10-day intervals. Start with low rate an increase to maximum as foliage develops. The spray interval may be reduced to 5 - 6 days during periods of we weather favoring late blight and/or vigorous crop growth

Wheat - May be applied early (when crop is in the 3 leaf to tillering stage) and/or late (when head is fully emerged, but prior to flowering). Do not make more than 2 applications per season.

Lentils – Apply the first application before flower when bud formation is evident. A second application should be applied 10 to 14 days after the initial application, but before rows close in to form a dense canopy. If conditions for disease development persist, a third application may be applied 10 to 14 days later. Do not apply more than three applications of Dithane DG per season.

Seed Alfalfa - Apply first application prior to 50% bloom. Repeat 7-10 days after the first application and 10 days after the second application. Do not make more than 3 applications per season.

How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity.

Cost (2002 suggested retail prices):

$3.60 to $7.20/acre.

Rates:

Potatoes - 0.45 to 0.90 kg/acre.

Wheat (early) - 0.45 kg/acre; wheat (late) - 0.9 kg/acre.

Lentils – 0.9 kg/acre.

Alfalfa - 0.6 kg/acre.

Nozzles:

Dithane DG Rainshield NT - flat fan.

Water Volume:

Thorough, uniform coverage is essential for good disease control.

Manzate 200-DF, Penncozeb 75 DF - 17 to 100 gallons/acre (80 to 400 L/acre) by ground sprayer; 5 to 7 gallons/acre (20 to 32 L/acre) by air.

Dithane DG Rainshield NT - 10 to 18 gallons/acre (45 to 80 L/acre) for ground application. Use 4 gallons/acre (18 L/acre) for aerial application.

Effects of Weather:

Dithane DG Rainshield NT - must be dry on plant leaf prior to rainfall; approximately 1 hour is required without rainfall at moderate temperatures and humidity.

Registered Mixes:

For Dithane DG Rainshield NT, add other co-applied fungicides, insecticides, growth regulators, micronutrients and spray adjuvants to the tank last. Do not let Dithane DG Rainshield settle out in unagitated spray tank.

Restrictions:

Grazing: Do not graze or feed treated straw or plant tops to livestock.

Preharvest Interval: Potatoes - 1 day.
Lentils – 35 days.
Wheat - 40 days.

Storage: Store in cool, dry, well-ventilated place. Keep away from fire and sparks.

Environment: Do not apply if weather favours drift from areas treated. Do not apply to water or wetlands.

Hazard Rating:

◈ Warning Poison - Eye irritant

Gavel 75 DF

Fungicide Group – 22, M
(Refer to page 233)

Company:

Dow AgroSciences

Formulation:

66.7% mancozeb and 8.3% zoxamide formulated as a dry flowable.

Crops:

Potatoes

Diseases Controlled:

Early and late blight

Crop Stage:

Optimum disease control is achieved when the fungicide is applied in a regularly scheduled preventative spray program. Begin applications at the first sign of disease or when blight is reported in the area. Apply at 0.90 kg/acre every 7 days under high disease pressure when either disease is present and environmental conditions favour continued disease development. Gavel 75 DF can be applied at 0.68 kg/acre every 7 days under low disease pressure and environmental conditions unfavorable for disease development. Do not apply more than 6 applications per season.

How it Works:

The active ingredient zoxamide is a benzamide fungicide with contact activity.

The mancozeb component is a dithiocarbamate fungicide with contact activity.

Cost (2002 suggested retail):

$11.52 to $15.50/acre

Rate:

Apply at 0.68 to 0.90 kg/acre

Nozzles:

Ground – generally hollow cone, disc – D5 to D7. Consult spray nozzle accessory catalogues for specific information on proper equipment calibration.

Aerial – hollow cone brass nozzles with a D-series orifice disc and core (whirlplate) are recommended. Nozzles should point straight down or slightly backward.

Water Volume:

Thorough, uniform coverage is essential for good disease control.

Ground – 20 gal/acre (90 L/acre).

Aerial – 4 to 8 gal/acre (18 to 36 L/acre). Use 36 liters of water under high disease pressure to provide better crop coverage.

Effects of Weather:

Must be dry on plant leaf prior to rainfall.

Registered Mixes:

None

Restrictions:

Preharvest Interval: 3 days.

Recropping: A 30 day plant back interval (PBI) is required for leafy vegetables and root and tuber vegetables. For all other crops not included on the label, the PBI should be 140 days.

Storage: Do not allow product to freeze. Keep away from fire and sparks. Store in a cool, dry, well ventilated place away from feed or food.

Environment:

Ground application – a buffer zone of 25m for application by ground sprayer should be established between the last spray swath and the edge of aquatic systems. A buffer zone of 5m for application by ground sprayer should be established between the last spray swath and the edge of terrestrial habitats such as hedgerows, windbreaks, woodlots, vegetative strips and other vegetation.

Aerial application – a buffer zone of 20m is required between the downwind edge of the boom and the closest edge of sensitive aquatic habitats.

Re-entry: do not re-enter treated areas within 48 hours of application.

Hazard Rating:

Caution – causes moderate eye irritation. This product is a dermal sensitizer. Avoid contact with skin, eyes or clothing.

Kumulus DF

Fungicide Group – M
(Refer to page 233)

Company:

BASF Canada

Formulation:

80% sulphur formulated as a water dispersible granular. Container size - 25 kg bag.

Crop:

Field peas.

Disease Controlled:

Powdery mildew.

Crop Stage:

Spray at first appearance of disease and repeat at 7 to 10 day intervals as necessary.

How it Works:

The active ingredient sulphur is an inorganic fungicide with contact activity.

Cost (2002 suggested retail price):

$2.13/acre

Rate:

0.6 kg/acre (one bag treats 41 acres).

Water Volume:

Minimum of 10 gallons/acre (45 L/acre). Higher water volumes may be required later in the growing season. Use sufficient water volume to thoroughly cover all foliage.

Effects of Weather:

Do not apply when rain or night frost is expected. Do not apply if temperature is above 27°C (in shade) and high humidity prevails, or if any of the above conditions are expected within 3 days after treatment. Do not apply under intense sunshine. Do not apply when weather favours drift.

Registered Mixes:

Do not mix with dinitro compounds, tetradifon or oils.

Restrictions:

Preharvest Interval: 1 day.

Application: Do not apply by air. Avoid drift onto neighbouring crops.

Storage: Keep away from heat, fire or sparks. Store in cool, dry, locked, well-ventilated area without floor drain.

Caution: Drift to off-target crops may cause leaf burn.

Polyram DF

Fungicide Group – M
(Refer to page 233)

Company:

BASF Canada

Formulation:

80% metiram formulated as dry flowable. Container size - 20 kg.

Crops:

Potatoes.

Diseases Controlled:

Early blight, late blight

Crop Stage:

Apply at 7 to 10 day intervals using 1.10 to 1.75 kg per hectare until plants cover the row. Then increase the rate to 2.25 kg per hectare until tops are killed, or use 1.10 to 1.75 kg per hectare at 5 to 7 day intervals starting when plants are 15 cm high and continuing until top killing. When conditions (rain or dew) favour infections, use the shorter intervals in each case.

How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity.

Cost (2002 suggested retail price):

$3.54 - 7.17/acre

Registered Mixes:

Polyram DF can be mixed with fertilizers after a physical compatibility test has been conducted.

Mixtures with diazinon or malathion should be prepared immediately prior to use and not allowed to stand in the tank.

Rates:

Apply 1.10 – 2.25 kg per hectare or 0.45 - 0.91 kg per acre

Water Volumes:

Ground - 8.8 to 17.6 gallons/acre (40 to 80 L/acre);
Aircraft - 4.9 gallons/acre (22 L/acre).

Nozzles:

Hollow cones or flat fans recommended.

Effects of Weather:

When weather conditions favor disease development th shorter spray intervals may be required.

Restrictions:

Grazing: Do not use treated crop parts for feed or food.

Preharvest Interval: May be applied up to the day befor harvest.

Recropping: None.

Storage: Store in a cool, dry place away from flame o sparks. If product becomes wet or overheated, effectivenes is reduced and flammable vapors may be produced. Do n freeze.

Environment: Do not apply when environmental condi tions favor drift from treated area. Do not contaminat domestic or irrigation water, lakes, streams or ponds by th cleaning of equipment or otherwise.

Quadris

Fungicide Group – 11
(Refer to page 233)

Company:

Syngenta

Formulation:

250 g/L azoxystrobin formulated as a flowable suspension concentrate

Container size – 4 x 3.78 L jugs

Crops:

Canola.

Diseases Controlled:

For the control of blackleg, sclerotinia stem rot and alternaria black spot.

Crop Stage:

Blackleg: Apply at the 2 to 6 leaf stage of canola.

Sclerotinia stem rot: Apply at early bloom (prior to 30% bloom). This will also suppress alternaria black spot.

Alternaria black spot: Apply at early pod stage (90% petal fall).

How it Works:

The active ingredient azoxystrobin is a methoxyacrylate compound (strobilurin) used as a broad spectrum preventative and curative fungicide.

Cost (2002 suggested retail prices):

$20.16/acre for control of blackleg and alternaria black spot.

$28.23 - $40.33/acre for control of sclerotinia stem rot.

Rate:

Blackleg and alternaria black spot: Use 0.2 L/acre.

Sclerotinia stem rot: Use 0.28 to 0.4 L/acre Use the higher rate if there is a history of sclerotinia stem rot infection in the area and when conditions favour development (heavy crop canopy, high humidity and/or excessive rain).

Water Volume:

Ground: Use sufficient water volume to obtain adequate coverage. Use minimum 9 gallons/acre (40 L/acre).

Aerial: Use minimum of 4 gallons/acre (18 L/acre). Ensure uniform application.

Registered Mixes:

None.

Restrictions:

Preharvest Interval: 30 days.

Recropping: Do not plant broadleaf or root crops within 30 days of application. Do not plant cereals within 45 days of application.

Application: Do not apply if rainfall is imminent. Do not apply during periods of dead calm, when winds are gusty or when wind speed is greater than 15 km/hr at 2 m above ground at the site of application.

Environment: For ground application maintain a 1 m buffer zone between areas sprayed and aquatic systems.

For aerial application allow a 6 m buffer zone. Quadris can be extremely phytotoxic to certain apple varieties. Do not apply where there is the possibility of spray drift reaching apple or crabapple trees.

Storage: Store in a cool, dry, well-ventilated area. Do not store below 0°C

Hazard Rating:

None.

Ridomil Gold/Bravo

Fungicide Group – 4, M
(Refer to page 233)

Company:

Syngenta

Formulation:

500 g/L chlorothalonil and 480 g/L metalaxyl-M in a Twin-Pak Jug. Container size - 8.83 L.

Crops:

Potatoes.

Diseases Controlled:

Early blight, late blight, late blight tuber rot, Botrytis vine rot.

Suppression of Pythium leak and Pink rot.

Crop Stage:

Begin preventive applications, early in the season when conditions are favorable for disease, (before infection), but no later than when the plant foliage meets within the row uniformly across the field. Apply a second and third application at 14-day intervals. The labeled rate of a registered contact fungicide should be applied 7 days after each application. Do not make more than three applications per season.

How it Works:

The metalaxyl component is an acylalanine fungicide with systemic activity.

The chlorothalonil component is a chloronitrile fungicide with contact activity.

Cost (2002 suggested retail price):

$29.00/acre

Rate:

One 8.83 L jug treats 10 acres. The entire contents of the jug must be added to the spray tank or an improper mixture will result.

Water Volume:

Ground - use sufficient water to ensure thorough coverage of foliage. Use a water volume of 20 to 140 gallons/acre (90 to 640 L/acre).

Aerial - use a minimum water volume of 5 gallons water/acre (23 L/acre).

Tank Mixes:

None registered.

Restrictions:

Resistance: Strains of late blight resistant to metalaxyl may develop especially when applied after disease is present. If late blight develops in the field, contact government Potato Specialist or Plant Disease Specialist.

Application: Do not make more than 3 applications per season.

Storage: Protect from excessive heat.

Environment: Do not apply where runoff is likely to occur. Do not use on coarse textured gravelly soils, soils with less than 2% organic matter or in areas where the water table may be high. Avoid application when weather favors drift. Avoid application by ground or air near or around bodies of water. Do not contaminate streams or ponds by spray drift, by cleaning equipment, or disposal of wastes. A buffer zone of 100 m for aerial application and 15 m for ground application should be observed to protect water bodies.

Hazard Rating:

Warning Poison

Warning, causes severe eye damage.

Ronilan EG

Fungicide Group – 2
(Refer to page 233)

Company:

BASF Canada

Formulation:

50% vinclozolin formulated as an extruded granular fungicide.

Container size - 12 kg (1.2 kg/PVC bag, 2 x 1.2 kg/pouch, 5 x 2.4 kg/pouch per box).

Crops:

Canola, beans.

Disease Controlled:

Canola - Sclerotinia stem rot.

Beans - Sclerotinia (white mold) and Botrytis (grey mold).

Crop Stage:

Canola - Apply once at 20 - 50% bloom, usually 4 to 8 days after first blooms appear in field.

For two applications, apply first at early bloom (20 - 30%) with a second application 7 days later at late bloom (70%) if the disease persists or weather conditions are favourable for disease development.

Beans - Apply at early to mid bloom (30 - 50%) with or without a second application 7 to 14 days later at full bloom if disease persists, or weather conditions are favourable for disease development.

How it Works:

The active ingredient vinclozolin is an dicarboximide fungicide with contact activity.

Cost (2002 suggested retail prices):

Canola - $11.92 to $23.84/acre

Beans - $23.84 to $47.68/acre

Rate:

Canola - 0.30 - 0.40 kg/acre. The high rate is used when conditions favor sclerotinia development (heavy crop canopy, high humidity, and/or excessive rain).

For split application, 0.2 kg/acre per treatment at early bloom (20-30%) and again 7 days later.

Beans - 0.4 kg/acre if using 2 applications/year, 0.6 kg/acre if using 1 application/year. Do not apply more than 0.8 kg/acre per season.

Water Volume:

Canola (by ground) - 10 to 20 gallons/acre (45 to 90 L/acre).

Canola (by air) - Use minimum 3.6 gallons/acre (16 L/acre).

Beans - Use sufficient spray volume to obtain thorough coverage of foliage. Use 10 to 20 gallons/acre (45 to 90 L/acre). Ground application only.

Pressure:

Minimum 275 kPa (40 psi).

Effects of Weather:

Do not apply if rain or frost is expected. If rainfall is imminent, delay spraying. Do not treat plants at very low temperatures. Do not apply to any crops that have been stressed due to conditions such as flooding, drought, etc.

Registered Mixes:

Insecticides: Lorsban and Pyrinex. See label for details on rates. Ronilan EG must be added first to mix.

Do not use a product that contains boron.

Restrictions:

Grazing: Do not allow livestock to graze on treated crop.

Preharvest Interval: 45 days for beans, 40 days for canola.

Storage: Store in original, tightly closed container in cool, dry, locked, well ventilated area without floor drain. Ronilan may be frozen.

Environment: For ground application, maintain 15 m buffer zone between area sprayed and aquatic systems, for aerial application allow a 100 m buffer zone.

Hazard Rating:

Caution Poison

Rovral Flo

Fungicide Group – 2
(Refer to page 233)

Company:

Bayer CropScience

Formulation:

240 g/L iprodione formulated as a liquid flowable. Container size - 8.4 L.

Crop:

Canola

Diseases Controlled:

Sclerotinia stem rot and Alternaria black spot.

Crop Stage:

Sclerotinia stem rot: Apply when crop is at the 20 to 30 percent bloom stage. For Argentine varieties when 15 to 20 flowers open (including small pods) on the main stem. For Polish varieties when 11 to 15 flowers (or small pods) are open on the main stem. Good coverage of plants is essential.

Alternaria black spot: Apply as a single spray at early green pod, or as split application: the first at full bloom, followed by a second application at early green pod stage. Early green pod stage occurs when almost all canola pods are fully formed and still green with only a few flowers or undeveloped pods remaining at the top of the plant. Good coverage of plants is essential.

How it Works:

The active ingredient iprodione is a dicarboximide fungicide with protective and eradicant activity.

Cost (2002 suggested retail price):

$21.76 to $32.26/acre

Rate:

Sclerotinia stem rot (white mold): 0.85 to 1.25 L/acre. Use of the higher rate is recommended for fields with a history of heavy disease pressure.

Alternaria black spot: A single application of 0.85 L/acre at early green pod. Split applications: 0.42 L/acre at full bloom followed by 0.42 L/acre at early green pod stage of canola.

Water Volume:

Ground: 10 gallons/acre (45 L/acre)

Air: Not less than 4.5 gallons/acre (20 L/acre)

Nozzles:

Flat fan or hollow cone for ground and properly calibrated aerial equipment.

Effects of Weather:

Do not spray in heavy dew or when rain is imminent within one hour. Spraying should be carried out in crosswind where possible. Avoid spraying in a dead calm and when wind speeds exceed 20 km/hr.

Tank Mixes:

Rovral should not be mixed with other pesticides, adjuvants or fertilizers except where stated.

Restrictions:

Application: Do not make more than 2 applications per season

Preharvest Interval: 38 days

Storage: Protect from frost.

Hazard Rating:

Caution Poison

Senator 70WP

Fungicide Group – 1
(Refer to page 233)

Company:
Engage Agro Corporation

Formulation:
70% thiophanate-methyl formulated as wettable powder. Container size - 2 kg.

Crops:
White beans.

Diseases Controlled:
Sclerotinia (white mold).

Crop Stage:
Apply when conditions favour disease development (i.e. , warm, humid weather and heavy, dense foliage). This usually occurs during early bloom stage, prior to rows closing in. If conditions favouring disease persist, repeat applications may be warranted.

How it Works:
The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity.

Cost (2002 suggested retail price):
$51.72 to $66.95/acre

Rate:
0.7 to 0.9 kg/acre (one container treats 2.14 to 1.67 acres).

Water Volume:
10 to 20 gallons/acre (40 to 90 L/acre).

Nozzles:
Ground - Flat fan.

Air - Hollow cone.

Registered Mixes:
Senator 70WP is compatible with most pesticides.

Do not mix with lime or other alkaline materials.

Restrictions:
Grazing: Do not feed or allow livestock to graze on treated crops.

Storage: Store in a dry place.

Resistance: Experience has shown that strains of fungi resistant to thiophanate-methyl may develop in treated crops.

Tattoo C

Fungicide Group – 28, M
(Refer to page 233)

Company:
Bayer CropScience

Formulation:
375 g/L propamocarb HCl and 375 g/L chlorothalonil formulated as a suspension. Container size - 10 L.

Crops:

Potatoes.

Disease Controlled:

Late blight.

Crop Stage:

Begin applications when conditions are favorable for disease, but before infection, and continue on 7 to 14-day intervals until threat of disease is over. Use the 7-day interval when the risk and conditions for disease are high. To avoid resistance, rotating and alternating applications with fungicides having different modes of action is recommended if multiple fungicide applications are required. Make no more than 3 applications per season.

How it Works:

The active ingredient propamocarb HCl is a carbamate fungicide with systemic activity. Chlorothalonil is a chloronitrile fungicide with contact activity.

Cost (2002 suggested retail price):

$30.20/acre

Rate:

1.09 L per acre.

Water Volume:

17.8 to 26.7 gallons/acre (80 to 120 L/acre).

Restrictions:

Grazing: Do not feed treated crops to livestock.

Preharvest Interval: 7 days.

Recropping: Do not plant a new crop in the treated area within 120 days of the last application.

Resistance: Plant diseases can develop resistance when exposed to one type of product or even products of similar chemistry. Use cultural practices and fungicide rotation as well as early preventive fungicide applications. Consult the government Potato Specialist or Plant Disease Specialist for disease outbreak forecasts and recommendations.

Application: Do not apply by air. Treatment with any product containing chlorothalonil must be separated by a minimum of 7 days.

Re-entry: Do not re-enter treated areas within 48 hours after treatment. If required, individuals may re-enter treated areas within 48 hours for short tasks not involving hand labour, provided that 4 hours have passed since application and that long pants and a long-sleeve shirt are worn.

Storage: Keep away from fire, open flame or other sources of heat. Do not store below freezing. Store the tightly closed container away from seeds, fertilizers, plants and foodstuffs.

Environment: Do not apply directly to water or areas where surface water is present. Do not apply where runoff is likely to occur. Do not contaminate water when disposing of equipment wash waters. Allow a buffer zone of 15 m around bodies of water when applying.

Tilt 250E

Fungicide Group – 3
(Refer to page 233)

Company:

Syngenta

Formulation:

250 g/L propiconazole formulated as an emulsifiable concentrate. Container sizes - 5 L, 4 x 5 L.

Crops:

Winter and spring wheat (including hard red, durum, Canada Prairie, soft white)

Spring Barley

Oats

Canaryseed

Canola.

Diseases Controlled:

WHEAT	BARLEY	OATS	CANOLA
Septoria leaf spot Tan spot Septoria glume blotch Stripe rust Powdery mildew Leaf and stem rust	Spot blotch Net blotch Scald Leaf rust Stem rust Septoria leaf spot Powdery mildew	Septoria leaf blotch Crown rust	Blackleg

Diseases Suppressed:

Canaryseed – Septoria leaf mottle

Crop Stage:

Wheat, barley, oats: Apply at the very early stage of disease development, anytime from the beginning of stem elongation to before the head is half emerged. Best results have been achieved when applied just when the flag leaf emerges. Tilt 250E last about 3 weeks in the plant. If conditions favourable to disease continue, another application may be necessary. The second application is usually applied at the time of head emergence.

Canaryseed: Apply at emergence of flag leaf.

Canola: Apply during the rosette stage (after second true leaf and prior to bolting).

How it Works:

The active ingredient propiconazole is a triazole fungicide with broad-spectrum systemic activity.

Cost (2002 suggested retail price):

$13.97/acre

Rate:

0.2 L/acre. One 5 L container treats 25 acres.

Water Volume:

Ground: Minimum 18 gallons/acre (80 L/acre).

Air: 4 to 5 gallons/acre (16-20 L/acre).

Nozzles:

Ground: Flat fan.

Air: Flat fan or hollow cone.

Registered Mixes:

In wheat and barley only, Tilt 250E may be applied with: 2,4-D amine, estimine 2,4-D, MCPA amine, estimine MCPA, Buctril-M or Pardner.

To ensure weed and disease control:

1. Weeds and crops must be at correct growth stage.
2. Tank mixes of Tilt 250E and Buctril-M or Pardner can only be applied by ground.
3. 2,4-D and MCPA formulations can be applied by ground or air.

Tilt 250E may be applied with small amounts of nitrogen. Rate of actual N not to exceed 4 kg/acre (9lb/acre). Add the nitrogen to the spray tank before adding Tilt 250E. Excessive nitrogen or application during hot weather may result in crop injury. Do not add nitrogen when tank-mixing Tilt 250E with a herbicide.

Effects of Weather:

If rainfall occurs within 1 hour of application, reapplication is necessary. For aerial application, wind speed should be less than 18 km/hr to avoid drift. High humidity and low temperature (10 - 20 °C) allow for better deposition of spray droplets.

Restrictions:

Grazing: Do not graze animals on treated green crops within 3 days of application. Do not feed straw treated with herbicide tankmixes to livestock.

Preharvest Interval: Wheat, oats, barley - 45 days. Canola - 60 days.

Recropping: None.

Storage: Do not freeze.

Environment: Do not contaminate food or feed. This pesticide is toxic to fish. Do not spray any body of water by direct application, drift or by cleaning equipment.

Hazard Rating:

Caution Poison

Seed Treatment Directory

Table 3. Seed Treatments in Field Crops

								CROP DISEASES/INSECTS CONTROLLED																											
	POTATO SEED PIECE							SEED AND SEEDLING ROTS/BLIGHTS													SMUTS CARRIED ON SEED							SMUTS IN SEED		BLACK LEG	Alternaria Black Spot	INSECTS			
FUNGICIDES	Page	Blackleg	Black Scurf/Silver Scruf	Common Scab	Seed Piece Decay	Storage Rot	Verticillium Wilt	Canola (Rapeseed)	Cereals	Chickpeas	Corn	Field Beans	Flax	Forage Legumes	Grasses	Lentils	Mustard	Peas	Soybeans	Sunflowers	Triticale	Barley - Covered	Barley - False Loose	Corn - Head Smut	Oats - Smut	Rye - Bunt	Rye - Stem Smut	Wheat - Bunt	Barley - Loose Smut	Wheat - Loose Smut	Canola (Rapeseed)	Canola (Rapeseed)	Wire Worms	Seed Corn Maggots	Flea Beetles	Root Maggots
Agrox B-3, Agrox D-L Plus, DLC	255										•	•						•	•														•	•		
Agrox CD, Agrox B-2	255										•	•						•	•															•		
Apron FL/Allegiance FL	256							•	•	•	•	•		•	•			•	•	•[4]																
Baytan 30	258								•[1]													•	•					•	•	•						
Captan Flowable	259										•	•						•	•																	
Charter	259								•													•	•		•			•	•	•						
Crown	261									•[2]						•[2]																				
DB-Green L, DB-Red L	262								•													•	•		•	•		•					•[5]			
DCT	263											•[3]																								•
Dividend XL RTA	264								•[1]													•	•					•		•						
Foundation Lite	267							•									•														•	•				
Gaucho CS FL	268							•									•														•	•			•	
Helix, Helix XTra	269							•									•														•	•			•	
Maxim PSP*	270		•		•																															
Mertect SC*	271		•		•	•																														
N-M Drill Box, N-M Dual Purpose	272								•				•									•	•		•	•		•					•[6]			
Polyram 16D*	273			•	•																															
Raxil FL, Raxil 250 FL	275								•													•	•		•			•	•	•						
Senator PSPT*	276	•	•		•		•																													
Thiram 75WP	277										•	•		•	•		•	•	•																	
Tuberseal*, Potato ST16*, Manco Plus*, Dithane F-45*	274 264				•																															
Vitaflo 280	281								•		•	•	•			•		•	•		•	•	•	•	•		•	•	•	•						
Vitavax Dual Powder	279								•				•									•	•		•		•	•	•	•			•			
Vitavax Dual Solution	279								•													•	•		•		•	•	•	•			•			
Vitaflo Dual Purpose	279								•[1]													•	•					•	•	•			•			
Vitavax Powder	281								•				•		•				•			•	•		•		•	•	•	•						
Vitavax rs Fungicide	278							•									•														•	•				
Vitavax Single Solution	284								•				•									•	•		•		•	•	•	•						

[1] wheat and barley only.
[2] also seed-borne ascochyta.
[3] also seed-borne anthracnose.
[4] also controis downy mildew.
[5] controlled only with DB-Green L.
[6] controlled only with N-M Dual Purpose.

* Products approved for use in potatoes by Midwest Food Products Inc. and McCain Foods (Canada).

Agrox D-L Plus/DLC/ Agrox B-3/Agrox CD/Agrox B-2

Fungicide Group – M
(Refer to page 233)

Company:

Norac Concepts Inc. (Agrox D-L Plus, Agrox B-3), United Agri Products (DLC)

Formulation:

Agrox D-L Plus and **DLC** - 15 percent captan plus 15 percent diazinon plus 25 percent lindane. Formulated as a powder.

Agrox CD – 15 percent captan plus 15 percent diazinon. Formulated as a powder.

Agrox B-3 – 33.5 percent captan, 11 percent diazinon, and 16.6 percent lindane.

Agrox B-2 – 33.5 percent captan, 11 percent diazinon.

Container sizes: Agrox D-L Plus, Agrox CD - 0.2 kg, 0.6 kg; Agrox B-3, Agrox B-2 - 2.0 kg; DLC - 0.05 kg, 0.5 kg.

Crops and Staging:

Corn, beans, soybeans, peas.

Seed treatment.

Diseases Controlled:

Seedling blight and seed rot.

Insects Controlled:

Agrox D-L Plus, DLC, Agrox B-3 - Wireworms and seed corn maggots.

Agrox CD, Agrox B-2 – Seed corn maggots.

Cost (2002 suggested retail prices):

Agrox CD, Agrox B-2 – Not available.

$32.10 for 600 g. Cost to treat 25 kg of seed - $2.67 (Agrox D-L Plus)

$88.70 for 2 kg. Cost to treat 25 kg of seed (dry application) - $3.55 (Agrox B-3)

$310.00 for 6 kg. Cost to treat 25 kg of seed - $2.84 (DLC)

Rate:

Agrox D-L Plus, Agrox CD - 0.05 kg per 25 kg of seed (one 0.6 kg container treats 300 kg, one 0.2 kg container treats 100 kg).

Agrox B-3, Agrox B-2 - Dry application: 0.08 kg (0.085 for corn) per 25 kg of seed. Slurry machines: adjust to apply 0.31 L (0.315 for corn) of slurry per 25 kg of seed and use 0.25 kg of seed treatment per L of water. Handmixing: 0.084 kg seed treatment per 0.5 L of water per 25 kg of seed.

DLC - One 0.5 kg tube treats 227 kg of seed, one 0.05 kg pouch treats 22.7 kg.

How it Works:

The active ingredient captan is a phthalimide fungicide with contact activity. The diazinon component is an organophosphate insecticide with contact and stomach activity. The lindane component is an organochlorine insecticide with contact and stomach activity.

Registered Mixes:

Do not use Agrox D-L Plus, Agrox CD or DLC on seed already treated with an insecticide (other than methoxychlor or malathion).

Do not use Agrox B-3 or Agrox B-2 on seed already treated with an insecticide.

Restrictions:

Use: Use Agrox D-L Plus, Agrox CD or DLC only on seed previously treated with captan or thiram.

Storage: Store in a cool, dry place. Treated seed must be labeled. Label unplanted treated seed as follows: "POISONOUS TO MAN AND ANIMALS. This seed has been treated with diazinon (and lindane) for the control of insects, and captan for disease control. Do not use for food or feed purposes. Do not sell to oil mills."

Precautions:

Do not mix with unprotected hands.

Hazard Rating:

☠ Danger Poison

Apron FL/Allegiance FL

Fungicide Group – 4
(Refer to page 233)

Company:

Gustafson

Formulation:

317 g/L metalaxyl formulated as a liquid seed treatment. Container size - 3.79 L.

Crops and Staging:

Alfalfa, beans, chickpeas, canola, clover, corn, grasses, low tannin lentils, peas, sainfoin, soybeans, sunflowers, and vetch. Crops for export only - wheat, barley, oats, rye, bird's-foot trefoil and sorghum.

Seed treatment.

Diseases Controlled:

Seed rots and seedling blights caused by Pythium spp. fungi, early season Phytophthora of soybeans, and downy mildew of sunflowers. Also (for export purposes only) downy mildew of peas, corn, and sorghum.

Cost (2002 suggested retail price):

$190/L

Rates and Water Volumes:

Use the high rate to treat poor quality seed, or if anticipate planting into cold, wet soils.

Rates for crop processed in Canada:

CROP	APRON FL or ALLEGIANCE FL (L per 100 kg seed treated)	WATER (L required to make up a total volume of 0.5 L)	KG SEED TREATED PER 3.79 L JUG
Chickpeas*, dry peas*	0.016 - 0.11	0.484 - 0.39	23,625 - 3,436
Canola (rapeseed)*, processing peas	0.032 - 0.11	0.468 - 0.39	11,812 - 3,436
Sainfoin, vetch, alfalfa, beans, clover, corn	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436
Grasses (forage), soybeans	0.046 - 0.093	0.454 - 0.407	8,217 - 4,064
Grasses (turf)	0.093	0.407	4,064
Sunflowers (high rate is for downy mildew control)	0.11 - 0.189	0.39 - 0.311	3,436 - 2,000
Low tannin lentils	0.016	0.484	23,625

*low rate gives good *Pythium* protection for 2 to 3 weeks.

Rates for crop to be exported:

CROP	APRON FL or ALLEGIANCE FL (L per 100 kg seed treated)	WATER (L required to make up a total volume of 0.5 - 0.62 L)	KG SEED TREATED PER JUG
Corn (downy mildew)	0.189 - 0.62	0.311 - 0	2,000 - 609
Peas (downy mildew)	0.146	0.354	2,589
Sunflowers (downy mildew)	0.62	0	609
Cereals (Pythium)	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436
Sorghum (Pythium)	0.093 - 0.11	0.407 - 0.39	4,064 - 3,436
Sorghum (downy mildew)	0.189	0.311	2,000
Bird's-foot trefoil	0.046 - 0.11	0.454 - 0.39	8,217 - 3,436

Registered Mixes:

Compatible on the seed with the following products:

Alfalfa, Peas	Thiram 75WP
Beans	Vitaflo 280
Low tannin lentil	Crown

Application Information:

Apron Fl and Allegiance FL should be mixed with water to form a slurry seed treatment. Apron FL and Allegiance FL contain no colourant. An appropriate dye such as Prolzed Dye must be added to slurry before treating seed.

When preparing the slurry the following procedure should be used:

1. Partially fill the mixing tank with water.
2. Add the required quantity of Apron FL or Allegiance FL onto the water surface.
3. Allow products to disperse and switch on agitation.
4. Top up with extra water to required volume and maintain agitation during use.
5. Add colourant last.

How it Works:

The active ingredient metalaxyl is an acylalanine fungicide with systemic activity.

Restrictions:

Use:

1. Treated seed must not be used for food, feed or oil processing.
2. Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure that treated seed is properly incorporated at planting.
3. Treated seed must be labeled as follows; **"This seed has been treated with Apron FL or Allegiance FL seed protectant which contains metalaxyl. Do not use for feed, food or oil processing."**

Storage: Do not store above 35°C or below 0°C. Store in original container, away from pesticides, food or feed. All bags containing seed for export must be labeled "For Export Only."

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting.

Comments:

Treatment of highly mechanically damaged, poor quality or low vigour seed may result in reduced germination and/or reduced seed and seedling vigour. If seed lot quality is unknown conduct a germination test prior to treating.

Hazard Rating:

Warning – Skin and eye irritant.

Baytan 30

Fungicide Group – 3
(Refer to page 233)

Company:

Gustafson

Formulation:

317 g/L triadimenol formulated as a liquid seed treatment. Container size - 3.78 L.

Crops and Staging:

Wheat, barley. Seed treatment.

Diseases Controlled:

Wheat and Winter Wheat: Loose smut, common bunt, powdery mildew (early season control), and suppression of take-all.

Barley: True loose smut, covered smut, false loose smut, leaf stripe, suppression of net blotch, scald and common root rot.

Cost (2002 suggested retail price):

$3.00 / 25 kg seed, low rate

Rates and Water Volumes:

0.05 L per 100 kg seed will control:
Barley - smuts, leaf stripe and suppression of common root rot and scald
Spring wheat - smuts, powdery mildew
Winter wheat - smuts

0.1 L per 100 kg of seed will control:
Barley - suppression of net blotch
Winter wheat - powdery mildew and suppression of take-all

BAYTAN 30 (L per 100 kg seed)	WATER REQUIRED (L)	SLURRY RATE (L)	KG SEED TREATED PER JUG
0.05	0.2 - 0.45	0.25 - 0.5	7,460
0.1	0.15 - 0.4	0.25 - 0.5	3,780

Registered Mix:

Baytan 30 can be applied on seed treated with Vitaflo 280.

How it Works:

The active ingredient triadimenol is a triazole fungicide with systemic activity.

Restrictions:

Use: Treated seed must be labelled, **"This seed has been treated with Baytan 30 containing triadimenol. Do not use for feed, food or oil processing."**

Storage: Do not store treated seed. Store product in original container only, away from other pesticides, fertilizer, food or feed. Keep container closed.

Grazing: Do not graze livestock on treated areas for 40 days after planting.

Resistance: Baytan 30 contains a triazole fungicide. Some loss of disease control may occur over time if Baytan 30 or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, due to the development of resistant strains of pathogens. Alternate use of Baytan 30 with fungicides with a different mode of action in your disease control program.

Comments:

Baytan 30 is a seed treatment available to commercial applicators only. Seed treated with this product will sometimes emerge at a slower rate than untreated seed. Avoid late planting of treated winter wheat. Germination and seed vigour may also be reduced under adverse environmental conditions such as cool, wet soil or seed planted greater than a 4 cm depth. Baytan 30 contains no colourant. An appropriate dye such as Prolzed Dye must be added before treating seed. No colourant is required if applying over seed treated with Vitaflo 280.

Captan Flowable

Fungicide Group – M
(Refer to page 233)

Company:

Norac Concepts Inc.

Formulation:

30 percent captan formulated as a flowable seed treatment. Container sizes - 20 L, 1000 L.

Crops and Staging:

Corn, beans, peas, soybeans. Prior to storage or as a seed treatment.

Diseases Controlled:

Storage rot, seed decay, root rot, damping off, seedling blight.

Cost (2002 suggested retail prices):

$0.96 per 25 kg of bean, pea or soybean seed.

$0.41 per 25 kg corn seed.

Rates:

CROP	CAPTAN FLOWABLE (L per 25 kg seed)
Beans	0.07
Corn (field)	0.03* - 0.05
Peas	0.07
Soybeans	0.07

*At this rate product is to be applied only by a professional applicator using equipment which will assure complete and uniform coverage.

How it Works:

Captan is a phthalimide fungicide with protective activity.

Restrictions:

Storage: Do not freeze. Product must be stored at ambient temperatures above 0°C and must not be stored with herbicides, feed, food or fertilizer. All treated seed should be labeled, **"Poisonous to man and animals. Do not use for food or feed. Do not sell to oil mills. This seed has been treated with Captan."**

Charter

Fungicide Group – 3
(Refer to page 233)

Company:

Bayer CropScience

Formulation:

25 g/L triticonazole formulated as a liquid seed treatment

Container size – 10 L(containing 3.1 L Charter)

200 L (containing 66.7 L Charter)

Crops and Staging:

Wheat, barley and oats.

Seed treatment.

Diseases Controlled:

CROP	DISEASES CONTROLLED	DISEASES SUPRESSED[1]
Wheat	Seed rot caused by *Fusarium* spp. Seedling blights caused by seed-borne *Fusarium* spp. Loose smut Common smut	Fusarium crown and root rot
Barley	Seed rot caused by *Fusarium* spp. Seedling blights caused by seed-borne *Fusarium* spp. Loose smut Covered smut False loose smut	Fusarium crown and root rot
Oats	Loose smut Covered smut	

[1] Suppression is defined as sub-optimal control that is still of commercial benefit.

Cost (2002 suggested retail price):

$6.39 / 100 kg seed

Rate:

100 mL concentrate / 100 kg seed (300 mL diluted product/100 kg seed)

Application Information:

Seed should be well conditioned and cleaned before treating. Treated seed should not require drying after treatment. Uniform coverage is required for good disease control. To ensure adequate coverage, add Charter slowly in a calibrated treating equipment system. Thoroughly mix the recommended amount of Charter into the required amount of water for the treater and follow manufacturer's instructions.

How it Works:

The active ingredient triticonazole is a triazole fungicide that provides systemic broad spectrum protection against seed and soil-borne diseases.

Restrictions:

Storage: Store product in the original container. Keep container closed. Store in an area that is out of reach of children and animals, away from food, feedstuffs, fertilizer and seed. Protect from frost and freezing. Store treated seed under cool, dry conditions. Do not store treated seed for more than 18 months as it may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 6 months should be tested for germination before use.

Treated seed should be labeled **"This seed has been treated with Charter, do not use for food, feed or processing"**

Environment: Do not feed or otherwise expose wildlife or birds to treated seed. Ensure proper disposal of any surplus treated seed not intended for later planting. Do not contaminate domestic, irrigation water or natural bodies of water..

Resistance: Charter contains a triazole fungicide. Some loss of disease control may occur over time if Charter or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, because of the development of resistant strains of pathogens. Alternate use of Charter with fungicides with a different mode of action in your disease control program.

Precautions:

When handling Charter or treated seed wear chemical resistant gloves and coveralls. Avoid inhaling or breathing dust. Work in a well-ventilated area or wear a dust filtering respirator in non-ventilated areas. Wash hands and exposed skin thoroughly after handling the concentrate and after application.

Hazard Rating:

Caution Poison.

Crown

Fungicide Group – 1, 7
(Refer to page 233)

Company:

Gustafson

Formulation:

92 g/L carbathiin and 58 g/L thiabendazole, formulated as a liquid seed treatment. Container size - 10 L.

Crops and Staging:

Lentil and chickpea. Seed treatment.

Diseases Controlled:

Seed-borne ascochyta in lentil caused by *Ascochyta lentis;* seed-borne ascochyta in chickpea caused by *Ascochyta rabiei.*

Seedling blights and seed rots caused by *Botrytis, Fusarium* and *Rhizoctonia* fungi.

Cost (2002 suggested retail price):

Lentil - $7.90 / 25 kg of seed

Chickpea - $3.95 – 7.90 / 25 kg of seed

Rates:

Lentil - 0.15 L per 25 kg of seed.

Chickpea - 0.075 – 0.15 L per 25 kg of seed. The lower rate will provide sufficient control of ascochtya in most cases. Use the higher rate for smaller seed size varieties.

Compatibility with Rhizobia Inoculum:

Crown is compatible with rhizobia. Contains a sticker for peat rhizobia. DO NOT TANK MIX CROWN WITH RHIZOBIA. Crown and rhizobia can be applied simultaneously to seed through separate systems or applied sequentially. Read inoculum label before use.

Application Information:

Commercial Treaters and On-Farm Auger Treating:
Crown is a ready to use formulation designed for commercial treaters and on-farm auger treating. Crown is added directly to the seed as it enters a mixing chamber or auger. It is important that the seed and chemical be mixed quickly and uniformly. See instructions supplied with the applicable treater system for information on proper application techniques. When a grain auger is used for treating, running the auger less than full is the key to adequate mixing. Augers used for handling treated seed should not be used to move seed for food, feed or oil processing.

Applications to Seed in a Hopper Box or Seed Drill: Partially fill the hopper box or seed drill with a pre-measured amount of seed. Apply the proper amount of Crown evenly over the seed surface. DO NOT pour in one area. Mix with a paddle until all seed is of a uniform red colour, indicating adequate coverage. DO NOT MIX WITH HANDS. Repeat this procedure until all the hopper box or seed drill is filled. Seed can be planted immediately after treatment without drying.

How it Works:

The active ingredient carbathiin is a systemic fungicide and the active ingredient thiabendazole is a benzimidazole fungicide with both contact and systemic activity.

Restrictions:

Use: Treated seed may be toxic to birds and other wildlife. Clean up any spilled seed. Ensure treated seed is properly incorporated at planting. Treated seed must not be used for food or feed.

Storage: Do not store product above 35°C or below 0°C or in direct sunlight. Store in original container only, away from other pesticides, fertilizers, food or feed. Treated seed must be labeled as follows: **"This seed has been treated with Crown seed protectant, which contains carbathiin and thiabendazole. Do not use for food, feed or oil processing."**

Grazing: Do not graze or feed livestock on treated areas for 4 weeks after planting.

Precautions:

When handling Crown or Crown-treated seed, work in a well-ventilated area; wear rubber gloves and protective eyewear.

Hazard Rating:

Caution – Eye irritant.

DB-Green L/DB-Red L

Fungicide Group – M
(Refer to page 233)

Company:

Agsco Inc., distributed by United Agri Products

Formulation:

DB-Green L - 323 g/L maneb plus 108 g/L lindane formulated as a liquid seed treatment. Container size - 57 L.

DB-Red L – 323 g/L maneb. Container size 57 L (returnable containers, customer pays only for product used)

Crops and Staging:

Wheat, barley, oats, rye. Seed treatment.

Diseases Controlled and Rates:

CROP	DISEASES CONTROLLED	RATE PER 25 KG SEED
Wheat	Common bunt Root rot Seedling bight (including *Fusarium*)	78 mL
Barley	Covered smut False loose smut Root rot Seedling blight	99 mL
Oats	Covered smut Root rot Seedling blight	138 mL
Rye	Common bunt Root rot Seedling blight	65 mL

Insects Controlled:

DB-Green L (only) - Wireworms.

Cost (2002 suggested retail prices):

DB-Red L: Not available.

DB-Green L:
Wheat - $1.50/25 kg seed
Barley - $1.91/25 kg seed
Oats - $2.66/25 kg seed
Rye - $1.25/25 kg seed

How it Works:

The ingredient maneb is a dithiocarbamate fungicide with contact activity. The active ingredient lindane is an organochlorine insecticide with contact and stomach activity.

Restrictions:

Storage: Store in a cool, dry area. If product becomes frozen, thaw and shake or agitate. If treated seed is stored, label container, **"This seed has been treated with DB-Green L or DB-Red L seed treatment. Do not use for food, feed or processing."** Excess treated seed should not be stored past planting time.

Environment: Do not contaminate ponds, lakes or streams.

Hazard Rating:

☠ Danger Poison

DCT

Fungicide Group – 1, M
(Refer to page 233)

Company:

Norac Concepts Inc.

Formulation:

6 percent diazinon, 18 percent captan, and 14 percent thiophanate-methyl formulated as a seed treatment powder. Container size - 10 kg, 400 g.

Crops and Staging:

Field beans. Seed treatment.

Diseases Controlled:

Seedling blight, root rot, seed-borne anthracnose. This product will not control anthracnose if seed is severely infected.

Insects Controlled:

Root maggots.

Cost (2002 suggested retail price):

$5.75 per 25 kg of seed

Rates:

For slurry machines - 0.52 kg per 1 L water. Use 1 L of slurry per 100 kg of seed.

For hand mixing - 0.13 kg per 0.35 L water. Use 0.35 L of slurry per 25 kg of seed.

How it Works:

The active ingredient captan is a phthalimide fungicide with protective activity. The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity. The diazinon component is an organophosphate insecticide with contact and stomach activity.

Restrictions:

Storage: Do not store treated seed for more than one month. Treated seed should be coloured and labeled **"Poisonous to man and animals. This seed has been treated with diazinon, captan and thiophanate-methyl for control of insects and seed-borne diseases. Do not use for food or feed purposes."**

Hazard Rating:

☠ Danger Poison

Dithane F-45

Fungicide Group – M
(Refer to page 233)

Company:
Dow AgroSciences

Formulation:
37% mancozeb formulated as a flowable.

Crop and Staging:
Seed potatoes in storage.

Diseases Controlled:
Fusarium dry rot.

Rate and Application Information:
1.58 L/1000 kg seed potatoes. Apply in 4 to 8 L of water as a spray on conveyor belt prior to storage.

Cost (2002 suggested retail price):
$7.00/L

How it Works:
Mancozeb is a dithiocarbamate fungicide with contact activity.

Restrictions:
Storage: Do not allow product to freeze. Keep away from fire and sparks. Store in a cool dry well-ventilated place away from feed or food.

Environment: Do not apply to water or wetlands. Do not contaminate water by cleaning of equipment or disposal of wastes.

Dividend XL RTA

Fungicide Group – 3, 4
(Refer to page 233)

Company:
Syngenta

Formulation:
3.21 % difenoconazole, 0.27 % metalaxyl-M formulated as a flowable seed treatment.

The formulation contains a colouring agent that will colour the treated seed.

Container size - 2 x 10 L jugs, 115 L returnable tote.

Crops and Staging:
Spring Wheat, Durum, Winter Wheat and Barley.

Seed treatment.

Rates and Diseases Controlled:

Crop	Rate/ 100 kg seed	Diseases Controlled	Diseases Suppressed[2]	Early Season Foliar Diseases Controlled[1]
Winter Wheat	650 mL	Common Bunt[3], Dwarf Bunt[3], Loose Smut, Seed-borne *Septoria*, Seed-borne and soil-borne *Fusarium*, General seed rots[4], *Pythium* damping-Off	Common Root Rot (*Cochliobolus* spp.), Take-all, *Fusarium* crown and root rot	*Septoria* Leaf Blotch
	325 mL	Common Bunt[3], Dwarf Bunt[3], Loose Smut, Seed-borne and soil-borne *Fusarium*, General seed rots[4], *Pythium* damping-Off	Common Root Rot (*Cochliobolus* spp.), Take-all, *Fusarium* crown and root rot	
Spring Wheat	650 mL	Common Bunt[3], Loose Smut, Seed-borne *Septoria*, Seed-borne and soil-borne *Fusarium*, General seed rots[4], *Pythium* damping-Off	Common Root Rot (*Cochliobolus* spp.), Take-all, *Fusarium* crown and root rot	
	325 mL	Common Bunt[3], Loose Smut, Seed-borne and soil-borne *Fusarium*, General seed rots[4], *Pythium* damping-Off	Common Root Rot (*Cochliobolus* spp.), Take-all, *Fusarium* crown and root rot	
Barley	650 mL	Seed-borne *Septoria*, False Loose Smut, Covered Smut, Seed-borne and soil-borne *Fusarium*, General seed rots [4], *Pythium* damping-Off	Take-all, *Fusarium* crown and root rot	
	325 mL	False Loose Smut, Covered Smut, Seed-borne and soil-borne *Fusarium*, General seed rots[4], *Pythium* damping-Off	Take-all, *Fusarium* crown and root rot	

[1] Dividend XL RTA provides control of early season *Septoria* leaf blotch in winter wheat for the first six (6) weeks after planting. For full season control, apply a foliar fungicide according to label directions.

[2] Suppression means consistent control at a level which is not optimal but is still of commercial benefit.

[3] Dividend XL RTA controls both seed and soil-borne common and dwarf bunt.

[4] General seed rots controlled include those caused by saprophytic organisms such as *Penicillium* and *Aspergillus*.

Cost (2002 suggested retail price):

$7.80 - $15.61/100 kg of seed

Application Information:

Dividend XL RTA is a ready-to-apply formulation for use in commercial seed treatment plants, and for on-farm treatment using standard gravity flow or mist-type seed treatment equipment which accurately meters and mixes a flowable seed treatment. The equipment must provide uniform coverage of Dividend XL RTA on the seed. Uneven seed coverage may not give the desired level of disease control.

Consult the manufacturer of the application equipment for suitability for this application and for instructions on operation and calibration of the equipment.

Water Volume: Dividend XL RTA (ready to apply) does not require addition of water for application. However, when using the Flexi-Coil Seed Treatment Unit, Dividend XL RTA must be diluted with water to reach 99 mL/10 kg of seed. The recommended dilution rate is 1 part Dividend XL RTA to 2 parts water. This is equal to 33 ml of Dividend plus 66 ml of water in order to achieve the total liquid volume requirement of 99 ml/10 kg seed.

How it Works:

The active ingredient difenoconazole is a systemic fungicide from the triazole fungicide class that provides broad-spectrum protection against seed and soil-borne diseases. Metalaxyl-M is an acylalanine fungicide with systemic activity against diseases caused by the Oomycetes, including *Pythium* damping-off.

Restrictions:

Use: Treated seed should be labeled **"This seed has been treated with Dividend XL RTA; do NOT use for food or feed."**

Storage: Keep in heated storage. Product will freeze at -18°C.

Environment: Do not apply directly to water or to areas where surface water is present. Do not contaminate food, feed, domestic or irrigation water supplies, lakes, streams and ponds. If treated seed is spilled outdoors or in areas accessible to birds, promptly clean up or bury to prevent ingestion..

Resistance: Dividend XL RTA contains a triazole fungicide. Some loss of disease control may occur over time if Dividend XL RTA or other fungicides in the triazole group are used repeatedly or consecutively in successive years on same fields, due to the development of resistant strains of pathogens. Alternate use of Dividend XL RTA with fungicides with a different mode of action in your disease control program.

Precautions:

Keep out of reach of children. When handling Dividend XL RTA, contaminated equipment or seed treated with Dividend XL RTA, wear long pants, a long-sleeved shirt and chemical resistant gloves. In addition, wear a suitable dust mask when bagging or sewing bags of treated seed or when transferring seed to a storage bin.

Hazard Rating:

None.

Foundation Lite

Fungicide Group – 2, M
(Refer to page 233)

Company:

Bayer CropScience

Formulation:

132 g/L iprodione and 88 g/L thiram. Container size - 100 L, 200 L, 1000 L.

Crop and Staging:

Canola, mustard. Seed treatment.

Diseases Controlled:

Damping off and root rot caused by *Rhizoctonia solani*, seed-borne blackleg and seed-borne Alternaria black spot.

Cost (2002 suggested retail price):

$19.42 / 25 kg seed

Rate:

563 mL/ 25 kg seed; 100 L container treats 4,444 kg of seed

Application Information:

Roll drum or stir well before using. Foundation Lite treated seed should not require drying after treatment and can be stored or bagged immediately. Add product to seed slowly and mix well for 3-5 minutes in treating equipment. Thorough seed coverage is required.

How it Works:

The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

The active ingredient iprodione is a dicarboximide fungicide with contact and eradicant activity.

Registered Mixes:

Treated seed can be mixed with the granular insecticide Counter 5G. Refer to the Counter 5G label for recommendations and precautions.

Restrictions:

Use: Treated seed must be labeled **"This seed has been treated with Foundation Lite containing iprodione and thiram. Do not use for feed, food or oil processing."** Date of treatment must also be included.

Storage: Protect product from frost. Store treated seed in cool dry conditions. Do not store treated seed for more than 6 months. Treated seed stored for periods in excess of 6 months may decrease in germination at a faster rate than untreated seed. Treated seed stored for more than 6 months should be tested for germination before planting.

Environment: Do not contaminate domestic or irrigation waters. Do not contaminate feed or food stuffs.

Precautions:

Keep out of reach of children; avoid contact with skin and eyes. When handling product or treated seed work in a well-ventilated area, wear chemical resistant gloves, coveralls and wear a suitable respirator. Do not consume alcoholic beverages 24 hours before or after working with Foundation Lite.

Hazard Rating:

Caution Poison

Gaucho CS FL

Fungicide Group – 7, M
(Refer to page 233)

Company:

Gustafson

Formulation:

285.7 g/L imidacloprid; 47.6 g/L carbathiin; 95.3 g/L thiram

Crops and Staging:

Canola, mustard. Seed treatment.

Product, Diseases, and Insects Controlled:

PRODUCT	Diseases Controlled	Insects Controlled
Gaucho CS FL	Seed-borne blackleg, seed rot and seedling blight caused by *Rhizoctonia*, *Pythium* and *Alternaria* spp.	Flea beetles[1]

[1] For areas where flea beetle population are often high, tank mix Gaucho CS FL with Gaucho 480 FL.

Cost (2002 suggested retail price):

Not available.

Rates:

1400 - 2100 mL / 100 kg seed (Be sure to adjust the application rate up by 6% when diluting the product to triple rinse the container for disposal. Please refer to Triple Rinsing Instructions for rinsate instructions).

Application Information:

Storage of Gaucho CS FL at low temperatures in not recommended. Prior to and during application, seed treatment must be thoroughly agitated to ensure uniform mixing of product. Keep above 10°C prior to and during application. Do not apply direct heat to container.

Restrictions:

Use: Treated seed must be labeled as follows: **"This seed has been treated with Gaucho CS FL seed protectant, which contains imidacloprid, carbathiin and thiram. Do not use for food, feed or oil processing. Store away from feeds and other foodstuffs".**

Storage: Treated canola, rapeseed or mustard seed stored for periods in excess of 9 months should be tested for germination before planting. Do not store treated seed above 25°C or in direct sunlight.

Grazing: Do not graze of feed livestock on treated areas for 4 weeks after planting.

Environment: Gaucho CS FL is highly toxic to birds and aquatic invertebrates. Do not apply directly to water or to areas where surface water is present. Do not contaminate water when disposing of equipment wash water. Cover or incorporate spilled treated seeds. Left over treated seed should be double sown around the headlands, or buried away from water sources.

Precautions:

Harmful if swallowed, absorbed through skin or inhaled. When handling Gaucho or Gaucho treated seed, work in well-ventilated area and wear chemical resistant gloves. DO NOT use leather or cloth gloves.

Hazard Rating:

☠ Caution poison.

Helix / Helix XTra

Fungicide Group – 3, 4, 12

(Refer to page 233)

Company:

Syngenta

Formulation:

Helix: 10.3% thiamethoxam, 1.24% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil, formulated as a liquid seed treatment.

Helix XTra: 20.7% thiamethoxam, 1.25% difenoconazole, 0.39% metalaxyl-M, 0.13% fludioxonil, formulated as a liquid seed treatment.

Container size – 105 L, 200 L, 450 L, 1050 L

Crops and Staging:

Canola, mustard. Seed treatment.

Diseases Controlled:

Seed-borne blackleg, seed-borne *Alternaria*, and the seedling disease complex (damping off, seedling blight, seed rot, root rot) caused by *Pythium* spp., *Fusarium* spp. and *Rhizoctonia* spp.

Insects Controlled:

Flea beetles:

Helix – 14 to 21 days

Helix XTra – 28 to 35 days

Cost (2002 suggested retail prices):

Not available.

Rate:

1.5 L / 100 kg of seed.

Application Information:

For use only in commercial seed treatment facilities with closed transfer systems. Helix is a ready to use liquid product, which includes a pigment. Apply using standard commercial seed treatment equipment that provides uniform seed coverage. Uneven or incomplete seed coverage may not give the desired level of insect or disease control. Consult the manufacturer of the seed treating equipment for advice on the operation and calibration of the equipment. Maintain constant agitation during the seed treatment process. Allow the seed to dry before bagging.

How it Works:

The active ingredient thiamethoxam is a systemic insecticide from the neonicotinoid chemical class. The active ingredient difenoconazole is a systemic fungicide from the triazole chemical class that provides broad-spectrum protection against seed and soil-borne diseases. The active ingredient metalaxyl-M is a acylalanine fungicide with systemic activity against diseases caused by the Oomycetes class, including Pythium damping off. The active ingredient fludioxonil is a phenylpyrrole chemistry derived and synthesized from exudates of the soil bacterium *Pseudomonas* and has contact and local penetrant properties.

Restrictions:

Use: All treated seed must be labelled **"This seed has been treated with Helix which contains the insecticide (thiamethoxam) and the fungicides (difenoconazole, metalaxyl-M and fludioxonil). Wear long-sleeve shirt, long pants, and chemical resistant-gloves when handling treated seed. Do not use for food, feed or oil processing. Store away from food and feed."**

Storage: Store in a well-ventilated, secure area. Avoid contamination of feed and foodstuffs. Keep out of reach of children.

Environment: Do not apply directly to water, or to areas where surface water is present. In cleaning of equipment or disposing of wastes, do not contaminate water used for human or animal consumption or by wildlife and aquatic life or for irrigation purposes.

Precautions:

Treat seed in a well-ventilated area. All seed treaters and handlers must wear chemical-resistant coveralls over long sleeve shirt and long pants, chemical-resistant gloves, head gear, and respiratory protection (i.e. half-mask respirator with suitable dust filter or fresh air hood).

Hazard Rating:

Caution Poison

Maxim PSP

Fungicide Group – 12
(Refer to page 233)

Company:

Syngenta

Formulation:

0.5% fludioxonil formulated as a dry powder. Container size – 10 kg

Crops and Staging:

Potatoes. Seed piece treatment.

Diseases Controlled:

Black scurf (*Rhizoctonia solani*), silver scurf (*Helminthosporium solani*), and fusarium dry rot (*Fusarium* spp.)

Cost (2002 suggested retail price):

$98.44/ 10 kg bag

Rate:

Use 0.5 kg per 100 kg of cut seed.

Application Information:

Cut pieces should be treated immediately after cutting. If treated seed pieces are bagged, they should be stored for 2-3 days in open crates before bagging. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential.

Apply using appropriate treater designed for treating potatoes or by dust attachment over belt. During treatment and planting wear two layers of clothing, a dust mask, and work boots. Wear chemical resistant gloves when handling Maxim PSP and when handling treated seed.

How it Works:

The active ingredient fludioxonil is a phenylpyrrole fungicide with contact activity.

Restrictions:

Storage: Store in a dry place.

Grazing: Do not treated seed for food or feed.

Resistance: Any fungal population may contain individuals naturally resistant to fludioxonil or strains of some fungi may develop tolerance to fungicides after prolonged use. It is important to follow label rate and directions and to observe all practices that minimize occurrence of resistance. Whenever possible, alternate with products from different chemical families. In order to minimize the potential for the development of resistance among labeled disease organisms do not use Maxim PSP in any two consecutive seed generations.

Hazard Rating:

Caution Poison

Mertect SC

Fungicide Group – 1

(Refer to page 233)

Company:

Syngenta

Formulation:

500 g/L thiabendazole formulated as a water dispersible suspension. Container size - 4 L.

Crops and Staging:

Potato. Post-harvest treatment.

Diseases Controlled:

Fusarium dry rot, skin spot, silver scurf, black scurf, and pocket rot

Cost (2002 suggested retail price):

$72.32/L

Rate and Water Volume:

7.5 L/37 gallons (170 L) of water.

2 L of the above solution treats 1 metric tonne (two containers treat 90 metric tonnes).

Application Information:

Do not allow suspension to stand without continuous agitation.

Potatoes must rotate along conveyor line to ensure complete coverage.

Prior to treating potatoes destined for export, confirm with authorities that treated potatoes will be allowed to enter importing country.

How it Works:

The active ingredient thiabendazole is a benzimidazole fungicide with systemic activity.

Restrictions:

Storage: Minimum storage temperature 0°C.

Resistance: Thiabendazole-resistant strains of silver scurf and fusarium dry rot can develop.

Strains of some fungi may develop tolerance to Mertect SC or other products in the same class of chemistry after prolonged usage. When using Mertect SC, use full rates and ensure thorough coverage. If potatoes are going to be treated with Mertect SC prior to storage in the fall, do not use any product containing thiophanate-methyl at planting. Do not use any product containing thiophanate- methyl if Mertect SC was used as the storage treatment on seed. Use seed treatment with a different mode of action on Mertect SC treated seed potatoes.

N-M Drill Box/ N-M Dual Purpose

Fungicide Group – M
(Refer to page 233)

Company:

Interprovincial Cooperative Ltd. (IPCO)

Crops and Staging:

Wheat, rye, oats, barley. Flax (N-M Drill Box only). Seed treatment.

Formulations:

N-M Drill Box - 50 percent maneb formulated as powder.
Container size - 1 kg.

N-M Dual Purpose - 37.5 percent maneb and 18.75 percent lindane formulated as powder.
Container size - 1 kg.

Diseases Controlled:

WHEAT	BARLEY	OATS	RYE	FLAX
Stinking smut (bunt) Seedling blight Root rot	Covered smut False loose smut Seedling blight Root rot	Loose smut Covered smut Seedling blight Root rot	Bunt Seedling blight	Seedling blight Damping off

Insects Controlled:

N-M Dual Purpose - Wireworms

Cost (2002 suggested retail prices):

N-M Drill Box - $16.25/kg
N-M Dual Purpose - $22.50/kg

Rates:

CROP	N-M DRILL BOX		N-M DUAL	
	RATE/25 KG SEED	AMOUNT SEED TREATED/PKG	RATE/25 KG SEED	AMOUNT SEED TREATED/PKG
Wheat	26 - 40 g	625 - 961 kg	52 g	480 kg
Barley	50 - 66 g	378 - 500 kg	65 g	384 kg
Oats	69 - 92 g	272 - 362 kg	92 g	271 kg
Rye	28 - 43 g	581 - 892 kg	56 g	445 kg
Flax	112 g	223 kg		

How it Works:

The active ingredient maneb is a dithiocarbamate fungicide with contact activity. The active ingredient lindane is an organochlorine insecticide with contact and stomach activity.

Restrictions:

Use: If treated seed must be stored, label as follows: **"Poisonous to man and animals. This seed has been treated with IPCO N-M Drill Box containing maneb for the control of seed-borne diseases."** or **"Poisonous to man and animals. This seed has been treated with IPCO N-M Dual Purpose Drill Box containing lindane and maneb for the control of wireworms and seed-borne diseases. Do not use for food or feed."** At the end of seeding, clean drill thoroughly and bury any dust or seed remaining.

Storage: Store in a dry, ventilated place. Avoid overheating. Keep away from fire or spark. Do not store treated seed for more than 1 year. Do not use treated seed in feed or foodstuffs.

Hazard Rating:

◈ Warning Poison

Polyram 16D

Fungicide Group – M

(Refer to page 233)

Company:

BASF Canada

Formulation:

16 % metiram formulated as dust. Container size - 10 kg.

Crops and Staging:

Potatoes. Seed treatment.

Diseases Controlled:

Fusarium seed piece decay; seed-borne common scab

Cost (2002 suggested retail price):

$48.95/bag; $2.20 -$3.18/100 kg cut seed

Rates:

0.45 - 0.65 kg/ 100 kg seed. One container treats 2,222 - 1,538 kg of seed.

How it Works:

The active ingredient metiram is a dithiocarbamate fungicide with contact activity.

Application Information:

Treated potato seed should not be allowed to stand in hot sun or drying wind. Seed should not be planted into hot, dry soil or in cold, wet soil. Plant as soon as possible after treating.

Restrictions:

Storage: Store product in a cool, dry place away from flame or sparks. If product becomes wet or overheated, effectiveness is reduced and flammable vapours may be produced. Do not freeze.

Grazing: Do not use treated crop parts for feed or food.

Potato ST 16/MancoPlus/ Tuberseal

Fungicide Group – M
(Refer to page 233)

Company:

Norac Concepts Inc. (MancoPlus, Tuberseal)
United Agri Products (Potato ST 16)

Formulations:

MancoPlus / Tuberseal - 16 % mancozeb formulated as a dust. Container size - 10 kg.

Potato ST 16 - 16 % mancozeb formulated as a dust. Container size - 20 kg.

Crops and Staging:

Potatoes. Seed treatment

Diseases Controlled:

Fusarium seed piece decay in potatoes.

Cost (2002 suggested retail prices):

Potato ST 16 - $2.28 /100 kg cut seed.
MancoPlus - $2.40 /100 kg cut seed.
Tuberseal - $2.47/100 kg cut seed.

Rates:

Potato ST 16 - 0.5 kg/100 kg seed.
MancoPlus, Tuberseal - 0.5 kg/100 kg seed.

Application Information:

Apply product before planting. If treated whole seed is cut, make a second application to protect cut surfaces. Plant as soon as possible after treating. If cut seed is not planted immediately, store in a ventilated location to allow cut surfaces to dry.

How it Works:

The active ingredient mancozeb is a dithiocarbamate fungicide with contact activity.

Restrictions:

Storage: Store product in a cool, dry, well-ventilated place. Keep away from fire and sparks.

Grazing: Do not use treated seed for feed or food.

Environment: Do not contaminate any body of water.

Hazard Rating:

◈ Warning Poison

Raxil FL/Raxil 250 FL

Fungicide Group – 3
(Refer to page 233)

Company:

Gustafson

Formulation:

Raxil FL: 8.33 g/L tebuconazole

Raxil 250 FL: 6 g/L tebuconazole

Formulated as a liquid seed treatment.

Container size – 2 x10 L, 200 L

Crops and Staging:

Wheat, barley and oats. Seed treatment.

Diseases Controlled:

Wheat: Loose smut, sinking smut or common bunt; seed rot and seedling blights caused by *Fusarium*; suppression of common root rot caused by *Cochliobolus sativus*.

Barley: False loose, covered and true loose smuts; barley leaf stripe; seed rot and seedling blights caused by *Fusarium*.

Oats: Loose smut

Cost (2002 suggested retail price):

$1.97 – 2.63 / 25 kg of seed

Rates:

	RAXIL FL			RAXIL 250 FL		
CROP	UNDILUTED CONCENTRATE ML/25 KG SEED	DILUTED CONCENTRATE mL/25 KG SEED*	KG SEED TREATED/10L CONCENTRATE OR 10.6 L OF DILUTED MIXTURE*	UNDILUTED CONCENTRATE ML/25 KG SEED	DILUTED CONCENTRATE mL/25 KG SEED*	KG SEED TREATED/10L CONCENTRATE OR 10.6 L OF DILUTED MIXTURE*
Wheat	45 – 60	48 – 64	5,556 – 4,167	63 – 83	66 – 88	4,000 – 3,000
Barley	45 – 60	48 – 64	5,556 – 4,167	63 – 83	66 – 88	4,000 – 3,000
Oats	60 – 90	64 – 95	4,167 – 2,778	83 – 125	88 – 133	3,000 – 2,000

* For dilution information refer to the "triple rinse instructions" on the product label.

Note: For the suppression of common root rot of wheat, use the higher rates per 25 kg seed. Use the higher rates where disease levels are likely to be high or on highly susceptible varieties.

Application Information:

Raxil FL and Raxil 250 FL are ready to use formulations designed for commercial or on-farm treatment with conventional seed treating equipment that can accurately control application rates and provide a good distribution of chemical onto seed. It is important that the seed and chemical are mixed quickly and uniformly. See manufacturer's instructions supplied with the treater system.

Uniform coverage at the correct rate is important for satisfactory results. Under-treatment may lead to loss of efficacy and over-treatment could reduce germination. Seed may be planted immediately after treating.

Treater calibration can be affected by temperature and should be rechecked on a regular basis. Undiluted product can be used at temperatures down to –10°C.

How it Works:

The active ingredient tebuconazole is a systemic, triazole fungicide that provides broad-spectrum protection against seed and soil-borne diseases.

Restrictions:

Use: Treated seed should be labeled **"This seed has been treated with Raxil FL / Raxil 250 FL (tebuconazole), do not use for food, feed or processing. Wear a long sleeved shirt and long pants (or coveralls) and chemical resistant gloves when handling treated seed."** Do not reuse container for any purpose. Augers used for handling treated seed should not be used to move seed for feed, food or oil processing. Do not reuse bags from treated seed to handle food or feed products.

Storage: If containers of Raxil FL and Raxil 250 FL have been stored for several months, some settling may occur that requires agitation. If 10 L containers are stored they should be shaken.

Grazing: Do not feed or graze livestock on treated areas for 4 weeks after planting.

Environment: Do not contaminate feed or foodstuffs with treated seed. Do not contaminate pods, lakes or streams.

Resistance:: Raxil FL and Raxil 250 FL contain a triazole fungicide. Some loss of disease control may occur over time if Raxil FL and Raxil 250 FL or other fungicides in this group are used repeatedly or consecutively in successive years on same fields, due to the development of resistant strains of pathogens. Alternate use of Raxil Fl and Raxil 250 FL with fungicides with a different mode of action (i.e. carbathiin) in your disease control program.

Precautions:

Germination will not be affected by treatment as long as over-application does not occur and seed is properly stored. All seed carried from one year to the next should be checked for germination before planting.

Keep out of reach of children. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear chemical resistant gloves when handling Raxil FL and Raxil 250 FL treated seed.

Hazard Rating:

Danger skin irritant.

Senator Potato Seed Piece Treatment

Fungicide Group – 1

(Refer to page 233)

Company:

Engage Agro Corporation

Formulation:

10 % thiophanate-methyl formulated as dust. Container size - 10 kg.

Crops and Staging:

Potatoes. Seed piece treatment .

Diseases Controlled:

Fusarium rot, verticillium wilt, silver scurf (*Helminthosporium solani*). Also aids in control of seed piece decay and blackleg infections.

Cost (2002 suggested retail price):

$106.95/bag; $5.35/100 kg cut seed

Rate:

Use 500 g per 100 kg cut seed (one bag treats 2,000 kg seed).

Application Information:

Apply in a convenient container or by dust attachment over belt. Cut pieces should be treated within 6 hours of cutting. For optimum control of silver scurf, ensure that seed tubers are completely free of soil. Total skin coverage is essential. If planting is to be delayed more than 1 to 2 days, the treated pieces should be stored for 2 to 3 days in open crates before bagging.

How it Works:

The active ingredient thiophanate-methyl is a benzimidazole fungicide with systemic activity.

Registered Mixes:

Do not mix with lime or other alkaline materials.

Restrictions:

Storage: Store product in a dry place.

Grazing: Do not use treated seed for feed or food. Environment: Do not contaminate domestic or irrigation water supplies, lakes, streams and ponds.

Resistance: Strains of fungi may develop tolerance to Senator PSPT or other products in the same class of chemistry after prolonged use. Use full label rates of Senator PSPT and ensure thorough coverage. When possible alternate with products from different chemical families. If potatoes are going to be treated with Mertect prior to storage in the fall, do not use Senator PSPT or any other product containing thiophanate-methyl at planting.

Do not use Senator PSPT or any other product containing thiophanate-methyl if Mertect was used as the storage treatment on the seed. Use a seed treatment with a different mode of action on Mertect treated seed potatoes. Implement an integrated disease management program that helps to maintain lower inoculum levels. This includes planting disease free tubers, crop rotation, and good hygiene in storage bins.

Thiram 75WP

Fungicide Group – M

(Refer to page 233)

Company:

Gustafson

Formulation:

75 % thiram formulated as wettable powder. Container sizes - 5 kg, 25 kg.

Crops and Staging:

Mustard, grasses, dry beans, peas, soybeans, safflower, corn, and alfalfa. Seed treatment.

Diseases Controlled:

Seed decay, seedling blight, damping off.

Cost (2002 suggested retail prices):

Mustard, grass and alfalfa seed - $3.30 / 25 kg
Dry bean, pea and soybean seed - $0.92 - $1.30 / 25 kg
Corn seed - $1.08 / 25 kg
Safflower seed - $1.85 / 25 kg

Rates:

CROP	KG THIRAM/ 25 KG SEED	AMOUNT OF SEED (KG) ONE 5 KG PACKAGE TREATS
Mustard, grasses, alfalfa	0.09	1,389
Dry beans, peas, soybeans	0.025 to 0.035	3,571 - 5,000
Field corn	0.03	4,166
Safflower	0.05	2,500

Compatibility with Rhizobia Inoculum:

Thiram is compatible with rhizobia, however, some restrictions may apply in storage length with Thiram-treated seed inoculated with rhizobia. Contact rhizobia manufacturer on use patterns with their rhizobia strain.

How it Works:

The active ingredient thiram is a dithiocarbamate fungicide with contact activity.

Restrictions:

Use: Treated seed should be labeled **"Do not use for food or feed. This seed has been treated with thiram"**

Storage: Store in a cool, dry, ventilated place, away from feeds and foods. Keep away from flame, sparks and heat.

Grazing: Do not graze treated areas or feed clippings from treated areas to livestock.

Precautions:

Do not consume alcohol 24 hours before or after working with thiram. Avoid breathing dust or spray mist. When treating, augering or handling treated seed, work in a well-ventilated area and wear a suitable dust mask, goggles and gloves.

Hazard Rating:

◈ Warning Poison

Vitavax rs Fungicide

Fungicide Group – 7, M
(Refer to page 233)

Company:

Gustafson

Formulation:

5.97% carbathiin and 11.94% thiram as a liquid seed treatment. Container size – 10 L, 100 L

Crops and Staging:

Canola, rapeseed and mustard. Seed treatment.

Diseases Controlled:

Canola, rapeseed and mustard: Seed rot, seedling blight and damping off caused by species of *Rhizoctonia*, *Pythium* and *Alternaria*.

Canola and rapeseed: Seed-borne blackleg.

Cost (2002 suggested retail price):

Not available.

Rate:

0.833 - 1.25 L / 100 kg of seed.

100 L will treat 8000 – 12,000 kg of seed

Application Information:

Prior to and during application, Vitavax rs Fungicide must be thoroughly agitated to ensure uniform mixing of product. Vitavax rs Fungicide treated seed does not require drying after treatment.

How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity.

Registered Mixes:

Can be co-applied on the seed with Apron FL and Gaucho 480 FL. Part of Gaucho Platinum and Gaucho Canola System.

Restrictions:

Use: Treated seed must be labeled **"This seed has been treated with Vitavax rs Fungicide, containing carbathiin and thiram, do not use for food, feed or oil processing"** Do not reuse container for any purpose. Augers used for handling treated seed should not be used to move seed for feed, food or oil processing. Do not reuse bags from treated seed to handle food or feed products.

Storage: Store product in original container only, away from other pesticides, fertilizer, food or feed. Treated canola or rapeseed stored for periods more than 9 months should be tested for germination before planting. Storage of Vitavax rs Fungicide at low temperatures is not recommended. Keep product above 10°C prior to and during application. Do not store treated seed above 25°C or in direct sunlight.

Environment: Do not feed or graze livestock on treated areas for four weeks after planting. Do not contaminate ponds, lakes or streams. Do not contaminate feed or foodstuffs with treated seed.

Precautions:

Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear chemical resistant gloves when handling treated seed and goggles to protect eyes from possible splashing. Keep out of reach of children. Because of possible unpleasant side effects, alcoholic beverages should be avoided for 24 hours before or after treating with Vitavax rs Fungicide.

Hazard Rating:

Caution Poison.

Caution – Eye irritant.

Vitavax Dual Powder/ Vitavax Dual Solution/Vitaflo Dual Purpose

Fungicide Group – 7, M
(Refer to page 233)

Company:

Gustafson

Formulation:

Vitavax Dual Powder - 20 percent carbathiin, 28.9 percent thiram, and 18.7 percent lindane formulated as powder. Container size - 1.5 kg.

Vitaflo Dual Purpose - 8.9 percent thiram, 10.1 percent carbathiin, and 12.9 percent lindane formulated as a liquid seed treatment. Container sizes - 10 L, 200 L.

Vitavax Dual Solution - 180 g/L carbathiin and 165 g/L lindane formulated as a solution. Container sizes - 10 L, 200 L.

Crops and Staging:

Vitavax Dual Powder - Wheat, barley, oats, rye, flax.

Vitavax Dual Solution - Wheat, barley, oats, rye.

Vitaflo Dual Purpose - Wheat, barley.

Seed Treatment.

Diseases Controlled:

PRODUCT	BARLEY	OATS	WHEAT	RYE	FLAX
Vitavax Dual Powder	False loose smut True loose smut Covered smut	Loose smut Covered smut	Loose smut Stinking smut (Bunt)	Stem smut Damping off Seed decay	Damping off Seed decay
Vitavax Dual Solution	False loose smut True loose smut Covered smut *suppression of leaf stripe, net blotch, common root rot	Loose smut Covered smut *suppression of common root rot	Loose smut Stinking smut *suppression of common root rot	Stem smut *suppression of common root rot	
Vitaflo Dual Purpose	False loose smut True loose smut Covered smut		Loose smut Stinking smut (Bunt)		

*will not protect post-seedling plants from infection.

Seed-borne seed rots and seedling blights are generally reduced with both powder and solution.

Insects Controlled:

Wireworms.

Cost (2002 suggested retail prices):

CROP	VITAVAX DUAL SOLUTION/ 25 KG SEED	VITAVAX DUAL POWDER/ 25 KG SEED	VITAFLO DUAL PURPOSE/ 25 KG SEED
Wheat	$3.02 - $3.63	$3.27	$3.27
Barley	$3.02 - $3.63	$3.51	$3.75
Oats	$3.02	$4.82	
Rye	$3.02	$3.03	
Flax		$3.51	

Rates:

	VITAVAX DUAL POWDER		VITAVAX DUAL SOLUTION		VITAFLO DUAL PURPOSE	
CROP	GRAMS POWDER/ 25 KG SEED	KG SEED TREATED/ CONTAINER	mL/25 KG SEED	KG SEED/10 L CONTAINER	mL/25 KG SEED	KG SEED/10L CONTAINER
Wheat	55 - 65	681 - 576	75 - 90	3,332 - 2,778	65	3,846
Barley	70	535	75 - 90	3,332 - 2,778	81	3,077
Oats	95	395	75	3,332		
Rye	60	625	75	3,332		
Flax	70	535				

Water Volume:

Do not dilute Vitavax Dual Solution with water.

How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity. The active ingredient thiram is a dithiocarbamate fungicide with contact activity. The active ingredient lindane is an organochlorine insecticide acting as a contact and stomach poison.

Restrictions:

Use: Treated seed must be labeled as follows: **"This seed has been treated with Vitavax Dual Solution Powder or Vitaflo Dual Purpose Seed Protectant - contains carbathiin, thiram and lindane; do not use for food, feed or oil processing."**

Storage: Do not store Vitavax Dual Solution below 0°C and keep away from spark and flame. Store powder in a dry place. Do not store seed treated with Vitavax Dual Powder. Do not store Vitaflo Dual Purpose above 35°C or in direct sunlight.

Grazing: Do not graze or feed livestock on treated area for 4 weeks after planting. Do not use treated seed for feed, food or oil processing.

Precautions:

Do not consume alcohol 24 hours before or after working with product or thiram-treated seed. Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear chemical resistant gloves when handling treated seed and goggles to protect eyes from possible splashing. Keep out of reach of children.

Comments:

Vitavax Dual Solution may damage painted surfaces by removing paint or leaving stain.

Hazard Rating:

☠ Warning Poison - **Vitavax Dual Solution**

☠ Danger Poison - **Vitavax Dual Powder**

☠ Danger Poison - **Vitaflo Dual Purpose**

Vitavax Powder/Vitaflo 280

Fungicide Group – 7, M
(Refer to page 233)

Company:

Gustafson

Formulation:

Vitavax Powder - 26.7 percent carbathiin and 38.8 percent thiram formulated as powder. Container size - 1.5 kg.

Vitaflo 280 - 14.9 percent carbathiin and 13.2 percent thiram formulated as a liquid suspension. Container sizes - 10 L, 200 L, 1000 L.

Crops and Staging:

Vitavax Powder - Oats, barley, wheat, rye, flax, soybeans, bromegrass.

Vitaflo 280 - Oats, barley, wheat, rye, triticale, flax, linola, soybeans, dry beans, corn, peas, lentils.

Seed treatment.

Cost (2002 suggested retail prices):

Cost to treat 25 kg of seed with Vitaflo 280:

$1.21 - 1.75 (wheat, barley, rye)

$1.07 (triticale)

$1.75 (peas, lentils, oats)

$2.77 (flax)

$1.38 (beans, soybean)

Application:

Vitaflo 280 can be diluted with water for use in slurry treaters. Dilute Vitaflo 280 as required to apply the specified rate of undiluted Vitaflo 280. Specific directions regarding dilution are contained in the Vitaflo 280 Operating Manual. Vitaflo 280 Operating Manual is available from your local Vitaflo dealer or by writing Uniroyal Chemical Elmira, Ontario. Agitate while diluting and continue agitating for approximately two minutes after diluting. Keep in constant agitation and use within 24 hours of diluting. DO NOT USE SLURRY TREATMENT FOR FLAX.

Vitaflo 280 should be used undiluted in all commercial seed treaters other than slurry treaters. Treater calibration should be rechecked if the Vitaflo 280 temperature falls below -18°C. Undiluted Vitaflo 280 can be used at temperatures down to -30°C.

How it Works:

The active ingredient carbathiin is carboximide fungicide with systemic activity and the active ingredient thiram is a dithiocarbamate fungicide with contact activity.

Tank Mixes:

Mixing of Vitaflo 280 with solvent based products may result in gelling or sedimentation. Seed treater lines and reservoirs should be thoroughly cleaned before use of Vitaflo 280. To clean, flush with water containing detergent.

Compatibility with Rhizobia Inoculum:

Vitaflo 280 is compatible with rhizobia. Do not tank mix Vitaflo 280 and rhizobia. Rhizobia and Vitaflo 280 should be applied sequentially through separate delivery systems. Apply Vitaflo 280 first, allow to dry, and then apply rhizobia. Always check with rhizobia manufacturers on any restrictions that may exist with seed treatments.

Diseases Controlled:

Cereals

PRODUCT	WHEAT	BARLEY	OATS	RYE	TRITICALE
Vitavax Powder	Loose smut Stinking smut (bunt)	False loose smut True loose smut Covered smut	Loose smut Covered smut Seedling blight	Stem smut Seed rot	
Vitaflo-280	Loose smut, Stinking smut (bunt), Seed rot Seedling blight	False loose smut True loose smut Covered smut Seed rot Seedling blight Suppression of net blotch	Loose smut Covered smut Seed rot Seedling blight	Stem smut Seedling blight Seed rot	Seedling blight Seed rot

Special Crops:

PRODUCT	FLAX/LINOLA	SOYBEANS	DRY BEANS	CORN	LENTILS, PEAS
Vitavax Powder	Seed rot Seedling blight	Seed rot Seedling blight			
Vitaflo-280	Seed rot Seedling blight	Seed rot Seedling blight	Seed rot Seedling blight	Seed rot Seedling blight Seed-borne head smut	Seed rot Seedling blights caused by *Pythium*, *Rhizoctonia*, and *Fusarium*

Rates:

CROP	VITAVAX POWDER (GRAMS) PER 25 KG SEED	VITAFLO-280 (mL) PER 25 KG SEED
Wheat	40 - 55*	57 - 82*
Barley	50	57 - 82*
Oats	70	82
Rye	45	57 - 82*
Triticale		50
Flax	60	131
Soybeans	65	65
Dry beans		65
Corn		70
Corn (for head smut)		140 - 187
Peas		82
Lentils		82

*Use higher rate for control of true loose smut in wheat and barley and stem smut of rye.

Restrictions:

Use: Seed treated with Vitaflo-280 must be labeled as follows **"this seed has been treated with Vitaflo 280 liquid seed protectant containing carbathiin and thiram. Do not use for feed, food, or oil processing. When augering or handling treated seed work in well-ventilated area and wear suitable mask, goggles and gloves".**

Storage: Store Vitavax Powder in a dry place. Do not store seed treated with Vitavax Powder.

Do not store Vitaflo 280 in direct sunlight or above 35°C. Vitaflo 280 will not freeze even at extreme temperatures. Do not store dry beans or soybeans treated with Vitaflo 280. Wheat, barley, rye, oats, triticale and flax seed treated with Vitaflo 280 can be stored up to 18 months without reduction in germination. Corn seed treated with Vitaflo 280 can be stored up to one year without reduction in germination.

Grazing: Do not graze or feed livestock on treated area for four weeks after planting. Do not use treated seed for feed, food or oil processing.

Precautions:

Work in a well ventilated area when treating seed or while augering or handling treated seed. Wear suitable dust mask, goggles and chemical resistant gloves. Keep out of reach of children. Do not consume alcoholic beverages 24 hours before or after treating seed with Vitaflo 280 or Vitavax Powder.

Hazard Rating:

◈ Warning Poison

Vitavax Single Solution

Fungicide Group – 7
(Refer to page 233)

Company:

Gustafson

Formulation:

230 g/L carbathiin formulated as a solution. Container sizes - 10 L, 200 L.

Crops and Staging:

Barley, wheat, oats, rye, flax. Seed treatment.

Cost (2002 suggested retail prices):

Cost to treat 25 kg of seed:
$1.52 - $1.88 (wheat, barley)
$1.52 (oats, rye)
$2.52 (flax)

Diseases Controlled:

BARLEY	WHEAT	OATS	RYE	FLAX
Covered smut True loose smut False loose smut Seed rot Seedling blight *Suppression of net blotch, leaf stripe, common root rot	Loose smut Stinking smut (bunt) Seed rot Seedling blight *Suppression of common root rot	Covered smut Loose smut Seed rot Seedling blight *Suppression of common root rot	Stem smut Seed rot Seedling blight *Suppression of common root rot	Seed rot Seedling blight

* will not protect plants from infection beyond the first leaf stage

Rates:

CROP	mL/25 KG SEED	KG SEED TREATED/ 10 L CONTAINER
Wheat**	60 - 75	4,167 - 3,333
Barley**	60 - 75	4,167 - 3,333
Oats	60	4,167
Rye	60	4,167
Flax	100	2,500

** For wheat and barley varieties highly susceptible to true loose smut and for high levels of smut or bunt on seed, the 75 mL rate will give increased disease control.

Application Information:

Vitavax Single Solution is a ready to use formulation designed for commercial treaters and on-farm auger treating. Do not dilute with water. It is important that the seed and chemical are mixed quickly and uniformly. See instructions supplied with the applicable treater system.

How it Works:

The active ingredient carbathiin is a carboximide fungicide with systemic activity.

Restrictions:

Use: Treated seed must be labeled as followed: **"This seed has been treated with Vitavax Single Solution Seed Protectant. Contains carbathiin; do not use for food, feed or oil processing."** Do not contaminate feed or foodstuffs.

Storage: Do not store below 0°C. Product is flammable. Keep away from flame and sparks.

Grazing: Do not graze or feed livestock on treated areas for four weeks after planting.

Environment: Do not contaminate ponds, lakes or streams.

Precautions:

Keep out of reach of children. Work in a well-ventilated area when treating or handling treated seed. Wear a suitable mask, gloves and goggles. Product may damage painted surfaces by removing paint or leaving stain. Do not use rubber or PVC hose.

Insect Control

Insect Control Decisions

Control of insects should be considered when numbers or damage exceed economic thresholds. To select an insecticide, verify the registered products for the insect and field crop in the following tables. Consideration should then be given to the rates, cost, preharvest intervals, the product application, restrictions, precautions and the hazard rating. The **preharvest interval** is the number of days that must pass between the last application of a pesticide and harvest. Harvest is the cutting of the crop or removal of the produce from the plant.

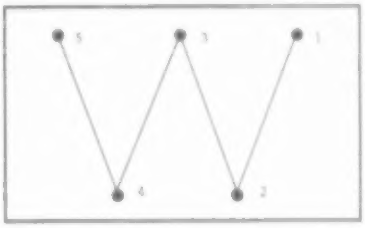
Field Scouting

Field scouting is the regular examination of fields to accurately assess the kind and the number of insects present and the amount of damage being done. Scouting should be done weekly during the growing season and daily when infestations approach economic levels or when weather conditions favour the rapid development of specific pests.

To properly scout for insect pests, you must know when they occur, where they live, what they look like, and how to find and count them. Generally, in fields of less than 100 acres, check a minimum of five locations. In fields greater than 100 acres, check a minimum of 10 locations. There are several possible scouting patterns that can be used when checking fields. These options are based on pest distribution and field configuration.

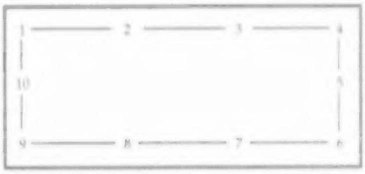
Pattern 1: Used when pests are uniformly distributed.

This scouting pattern typically looks like an X, Z or W, excluding field edges. Pests that fit this pattern include aphids, bertha armyworm, diamondback moth, lygus bugs.



Pattern 2: Used when pests are at the edges of fields.

Scout by walking along field edges, fence lines or ditches. Some examples of pests appearing at the edges of fields include flea beetles, colorado potato beetles and grasshoppers.



The following tables outline monitoring methods, typical symptoms and **economic thresholds** for the more common crop pests. The **economic threshold** is the minimum number of insects or damage to the crop that should result in management action. Note that factors such as moisture, temperature conditions and stage of crop growth, can increase or decrease the impact of insects on crop production.

Estimating Percent Defoliation

Many action thresholds for insects are based on percent defoliation of the plants they are feeding on. The following figure may assist in determining the percent defoliation. Although the photo below is of sunflower leaves, this figure can be used to estimate % defoliation for many crops.

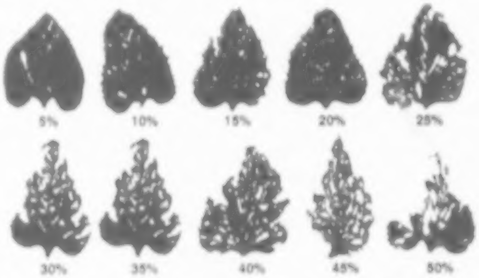


Photo courtesy of North Dakota State University Extension Service

Reducing Bee Losses from Insecticides

Careless use of insecticides can kill bees and other beneficial insects such as pollinators, predatory and parasitic biological control insects. Help to reduce insecticide poisoning of bees by:

1. **Avoid applying insecticides which are toxic to bees on crops in bloom.** Any field with even a small amount of bloom, whether it is the main crop, cover crop, or weeds will probably have foraging bees visiting the flowers. If at all possible, apply insecticides before or after the crop has gone into bloom. Control all flowering weeds prior to insecticide application.
2. **Apply insecticides when bees are least active.** The highest level of bee activity occurs during the day. Apply insecticides in late evening or early morning when the bees are not foraging. As a general rule, evening applications are less hazardous to bees than morning applications.
3. **Avoid insecticide drift.** To avoid insecticides drifting into non-target locations, do not apply insecticides during windy conditions. Choose nozzles with a low drift rating. As a general rule, ground applications of insecticide are less prone to drift than aerial applications.

4. **Contact the beekeeper before spraying.** Communication and cooperation between the insecticide applicator and the beekeeper can usually prevent bee losses. Notifying the beekeeper in advance (i.e. 48 hours) of applying insecticides will allow the beekeeper to move or protect the colonies from insecticide damage.

5. **If possible, use insecticides and/or insecticide formulations which are the least hazardous to bees.** The following table "Field Hazard of Insecticides to Bees" will help in selecting the least hazardous insecticide. In general, dusts are more hazardous to bees than sprays. Wettable powders are more hazardous than emulsifiable concentrates (EC) or water-soluble formulations. Granular insecticides and spreadable bran bait insecticides are generally the least hazardous to bees.

Field Hazard of Insecticides to Bees

The following table indicates the maximum time required for the insecticides listed in the Guide to be degraded by weather to a low hazard level for bees. **These times are to be used as general guidelines only.** Most of these insecticides have not been tested for bee toxicity under Western Canadian conditions and environmental conditions influence the rate at which pesticides degrade.

INSECTICIDE	TOXICITY RATING		RESIDUE HAZARD (DAYS)[a]
	HONEY BEE	LEAFCUTTER BEE	
Admire	1	1	–[b]
Cygon/Lagon	1	1	10
Cymbush/Ripcord	–[b]	–[b]	–[b]
Decis	2	2	1
Diazinon	–[b]	–[b]	–[b]
Dibrom	1	1	–[b]
Dylox	2	2	0.5
Eco bran bait	3	3	N/A
Endosulfan/Thiodan/ Thionex	2	1	2
Furadan 480F	1	1	5
Guthion/Sniper	1	1	5
Lannate	1	1	1.5
Lorsban/Nufos/Pyrinex	1	1	3.5
Malathion	2	1	2 (Honey Bee), 6 (Leafcutter Bee)
Matador	2	2	1
Monitor	1	1	1
Pirimor	2	2	0.5
Pounce	1	1	5
Sevin	1	1	7

TOXICITY RATING 1 = High 2 = Moderate 3 = Low

[a] Residue hazard represents the average time in days that residues poisonous to bees will remain on foliage. Most of this information has not been generated under Western Canadian growing conditions and should be used only as a guideline.

[b] Information currently not available, although these products are known to be toxic to bees.

Field Scouting in Alfalfa

LYGUS BUG/ ALFALFA PLANT BUG

Typical Damage: Field blooms poorly or not at all. Flower buds blasted, whitish, and dry; flowers dropping off before fully open. Collapsed seed.

When and How to Monitor: Monitor June through mid-August. Make five 180° sweeps with a 15 inch (40 cm) insect net through alfalfa canopy at each sampling site. Record total number of plant and lygus bugs (both nymphs and adults) captured. Calculate average number per sweep.

Economic Threshold: Hay: Control not recommended. Seed alfalfa at bud and early bloom: 8 lygus bugs/sweep; 4 alfalfa plant bugs/sweep; or 5 bugs if the plant bug population is a combination of lygus bugs and alfalfa plant bug. If insecticides are used, attempt to spray before the onset of bloom. *Protecting insect pollinators in seed production fields is very important.*

ALFALFA WEEVIL

Typical Damage: Feed on developing buds and leaves. Stunt growth.

Economic Threshold: One of the best control strategies is to cut fields for hay early. If early cutting of the crop is not possible, treatment should be considered when there are 20-30 larvae per 180° sweep; or 35-50% of foliage tips show feeding.

PEA APHID

Typical Damage: Suck juice from plants; stunt growth; cause premature drying

When and How to Monitor: Monitor July through August. Take 5 sweeps at each location. Monitor fields closely during periods of slow plant growth.

Economic Threshold: 100-200 aphids/180°sweep when crop is moisture stressed, or until mid-August. Note: A U.S. recommendation is to not control with insecticides if the ratio of ladybird beetles to aphids is equal or more than 1 adult per 5-10 aphids, or 3 larvae per 40 aphids. Light populations of pea aphids may be beneficial by providing a food source for predatory and parasitic insects.

ALFALFA BLOTCH LEAFMINER

Typical Damage. Females feed by puncturing leaves with their ovipositors, creating characteristic "pinholes," and consuming plant juices. A single female creates an average of 3,769 pinholes during her lifetime. Larvae create distinctive mines as they feed. Infested fields take on a whitish cast due to the larvai mines in the leaves.

Economic Threshold: Treatment is suggested if 30-40% of the plants exhibit pinhole feeding injury. If insecticides are used, they must be applied during the "pinhole" stage.

Alfalfa Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Lygus bugs	Matador	0.034 L	$4.75	Do not apply within 14 days of livestock foraging.	A or G	64-110
	Decis 5EC (seed) production only	0.08-0.1 L	$6.92-$8.65	20	G	395
	Dylox	1.11 L	$19.26	14	A or G	950
	Malathion 500	0.80-1.21 L	$10.12-$15.31	7	A or G	4302
	Malathion 500E/ Fyfanon	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800/ 3400
	Guthion SC	0.91-1.41 L	$14.56-$22.56	21	A or G	21-37
	Guthion 50/ Sniper	0.45-0.70 L	$13.10-$20.37	21	A or G	12.3 – 24.7/7
	Cygon 4E	0.17 L	$4.08	2	A or G	450
	Cygon 480 (alfalfa) seed production	0.44 L	$10.56	28	A or G	450
	Lagon (seed production only)	0.44 L	$10.01	28	A or G	60
	Dibrom	0.44-0.88 L	$16.01-$32.01	4	A or G	345

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Alfalfa plant bug	Dylox	1.11L	$19.26	14	A or G	950
	Guthion SC Guthion 50/ Sniper	0.91-.141 L 0.45-0.70 L	$14.56-$22.56 $13.10-$20.37	21	A or G	21-37 12.3-24.7/7
	Cygon 4E	0.17 L	$4.08	2	A or G	450
	Cygon 480 (alfalfa seed production)	0.44 L	$10.56	28	A or G	450
	Lagon (seed production only)	0.44 L	$10.01	28	A or G	60
Grasshoppers	Eco bran bait	0.8-1.6 kg	$2.80-$5.60	2	G	NA
	Matador (young grasshoppers only)	0.026-0.034 L	$3.63-$4.75	Do not apply within 14 days of livestock foraging.	A or G	64-110
	Malathion 500 (young grasshoppers)	0.80-1.21 L	$10.12-$15.31	7	A or G	4302
	Malathion 500E/ Fyfanon (young grasshoppers)	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800/ 3400
	Guthion SC Guthion 50 (border application only)	0.44-0.70 L 0.21-0.34 L	$7.04-$11.20 $6.04-$9.78	21	A or G	21-37 12.3-24.7
	Sevin	0.50-1.01 L	$7.00-$14.14	2	A or G	649
	Cygon	0.17-0.34 L	$4.08-$8.16	2-7	A or G	450
	Lagon	0.22-0.36 L	$5.01-$8.19	2-7	A or G	60
	Methoxychlor	2.02-2.53 L	$56.96-$71.35	7	G	5000-7000
Alfalfa weevil	If alfalfa has reached the bud or early bloom stage, immediate cutting will kill many alfalfa weevil larvae					
	Matador	0.034 L	$4.75	Do not apply within 14 days of livestock foraging.	A or G	64-110
	Decis 5EC (seed crops only)	0.08-0.1 L	$6.72-$8.40	20	G	395
	Malathion 500	0.80-1.21 L	$10.12-$15.31	7	A or G	4302
	Malathion 500E/ Fyfanon (larvae only)	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800/ 3400
	Guthion SC Guthion 50/ Sniper	0.91-1.41 L 0.45-0.70 L	$14.56-$22.56 $13.10-$20.37	21	A or G	21-37 12.3-24.7/7
	Imidan	0.91 kg	$19.40	7	G	285
	Methoxychlor	2.02-2.53 L	$56.96-$71.35	7	G	5,000-7,000

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Spider mites	Malathion 500E	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800
	Fyfanon	0.91-1.01 L	$11.19-$12.42	7	G	3400
Potato leafhopper	Matador	0.034 L	$4.75	Do not apply within14 days of livestock foraging.	A or G	64-110
	Malathion 500E/ Fyfanon	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800/ 3400
	Malathion 500	0.80-1.21 L	$10.12-$15.31	7	A or G	4302
	Guthion SC	0.91-1.41 L	$14.56-$22.56	21	A or G	21-37
	Guthion 50/ Sniper	0.45-0.70 L	$13.10-$20.37	21	A or G	12.3-24.7/7
	Sevin	1.01-1.6 L	$14.14-$22.40	2	A or G	649
	Cygon	0.17 L	$4.08	2	A or G	450
	Lagon	0.17 L	$3.87	2	A or G	480
	Dibrom	0.44-0.88 L	$16.01-$32.01	4	A or G	345
	Methoxychlor	2.02-2.53 L	$56.96-$71.35	7	G	5,000-7,000
Pea Aphid	Matador	0.034 L	$4.75	Do not apply within 14 days of livestock foraging.	A or G	64-110
	Malathion 500	0.80-1.21 L	$10.12-$15.31	7	A or G	4302
	Malathion 500E/ Fyfanon	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800/ 3400
	Cygon	0.17 L	$4.08 L	2	A or G	450
	Lagon	0.17 L	$3.87	2	A or G	60
	Dibrom	0.44-0.88 L	$16.01-$32.01	4	A or G	345
True Armyworm	Sevin	1.01-2.12 L	$14.14-$29.68	2	A or G	649
	Methoxychlor	2.83-4.55 L	$79.81-$128.31	7	G	5,000-7,000
Beet webworm	Sevin	1.01-2.12 L	$14.14- $29.68	2	A or G	649
Alfalfa looper	Dibrom	0.44-0.88 L	$16.01-$32.01	4	A or G	345
Alfalfa blotch leafminer	Malathion 500E/ Fyfanon	1.11 L	$13.65	7	A or G	1375-2800/ 3400
	Cygon 480	0.22 L	$5.28	2	A or G	450
	Lagon	0.22 L	$5.01	2	A or G	60
	Imidan	0.91 kg	$19.40	7	G	285
Sweet clover weevil	Guthion SC Guthion 50/ Sniper	0.91 L 0.45 L	$13.10 $14.56	21	A or G	21-37 12.3-24.7
	Cygon 4E	0.34-0.44 L	$8.16-$10.56	28	A or G	450
	Methoxychlor	2.02-2.53 L	$56.96-$71.35	7	G	5,000-7,000

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Blister beetle	Sevin	1.01-1.6 L	$14.14-$22.40	2	A or G	649
Alfalfa caterpillar	Dylox	0.40-0.61 L	$6.94-$10.58	14	Aor G	950
	Sevin	1.01-2.12 L	$14.14-$29.68	2	A or G	649

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Barley – See Small Grains

Scouting for insects in Beans (Dry Field Beans)

SEEDCORN MAGGOT

Typical Damage: Seedcorn maggot attacks bean seed, preventing sprouting or weakening seedlings. The yellowish white maggot is found burrowing in the seeds or emerging stem. Seedcorn maggots are usually most severe in wet, cold seasons and on high organic matter soils.

LEAFHOPPERS

Typical Damage: Foliage becomes dwarfed, crinkled, and curled. Small triangular brown areas appear at the tips of leaves, gradually spreading around the entire leaf margin.

Economic Threshold: An average of one leafhopper per trifoliate leaf. Do not let infestations and damage progress to the point that yellowing of foliage is easily detected.

Beans Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Lygus Bugs	Cygon	0.28-0.40 L	$6.72-$9.60	7	A or G	450
	Dylox (dry, Lima, and snap beans)	1.11-1.62 L	$19.26-$28.11	14 (snap and dry beans) Do not apply to Lima beans after pod set	A or G	950
	Sevin XLR Plus	2.12-2.59 L	$29.68-$36.26	5	A or G	649
	Thimet	2.93-4.45 kg	$16.23-$24.65	Planting	G	27-31
Aphids	Malathion 500	0.56-1.21 L	$7.08-$15.31	1	A or G	4302
	Malathion 500E/ Fyfanon	0.61-1.11 L	$7.50-$13.65	3 (500E) 1 (Fyfanon)	A or G	1375-2800 3400
	Thionex	0.6-1.0 L	$8.70-$14.50	2	A or G	110
	Thiodan	0.6-1.0 L	$9.24-$15.40	2	A or G	107.2
	Cygon	0.28-0.40 L	$6.72-$9.60	7	A or G	450
	Lagon	0.28-0.40 L	$6.37-$9.10	7	A or G	60
	Dibrom (Dry,Field,Lima)	0.445-0.890 L	$16.01-$32.01	4	A or G	345

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
	Diazinon (Field)	0.445 L	$6.94	7	G	1960
	Di-Syston	3.0-6.1 kg	$21.90-$44.53	60	G	14-52
	Thimet	2.93- 4.45 kg	$16.23-$24.65	Planting	G	27-31
Seedcorn Maggot	Sow seeds as shallow as possible in a warm, well-prepared seedbed. If manure is used, apply and plow it under the previous fall.					
	Agrox B-3, Agrox D-L Plus, DLC, DCT	See Seed Treatments section of Guide to Crop Protection			Seed treatment	N/A
Wireworms	Agrox B-3	0.08 kg/ 25 kg of seed	$3.69/25 kg of seed	Seed Treatment	Seed Treatment	NA
	Agrox D-L Plus	0.05 kg/ 25 kg of seed	$2.60/25 kg of seed	Seed Treatment	Seed Treatment	N/A
	DLC	One 0.5 kg tube treats 227 kg of seed, one 0.05 kg pouch treats 22.7 kg	$2.84/25 kg of seed	Seed Treatment	Seed Treatment	N/A
Potato Leafhoppers	Malathion 500	0.56-1.21 L	$7.08-$15.31	1	A or G	4302
	Malathion 500E/ Fyfanon	0.61-1.11 L	$7.50-$13.64	3 (500E) 1 (Fyfanon)	A or G	1375-2800 3400
	Thionex	0.6-1.0 L	$8.70-$14.50	2	A or G	110
	Thiodan	0.6-1.0 L	$9.24-$15.40	2	A or G	107.2
	Sevin XLR Plus	1.01 L	$14.14	5	A or G	649
	Cygon	0.28-0.40 L	$6.72-$9.60	7	A or G	450
	Methoxychlor	1.21-3.64 L	$34.12-$102.65	7	G	5000-7000
	Di-Syston	3.0-6.1 kg	$22.19-$44.53	60	G	14-52
Grasshoppers	Eco bran bait	0.8-1.6 kg	$2.80-$5.60	5	G	N/A
	Lagon	0.28-0.36 L	$6.37-$9.10	7	A or G	60
Variegated Cutworm	Dylox	1.11-1.62 L	$19.26-$28.11	14	A or G	950
	Sevin XLR Plus	30-35 mL/ 100 m of row		5	A or G	649
Armyworms	Dylox	1.11-1.62 L	$19.26-$28.11	14	A or G	950
Alfalfa looper	Dibrom	0.445-0.890 L	$16.01-$32.01	4	A or G	345
Thrips	Thimet	2.93-4.45 kg	$16.23-$24.65	Planting	G	27-31

D$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% f the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

Scouting for insects in Canaryseed

APHIDS

When and How to Monitor: Start checking for aphids during the early heading stage of canaryseed. The head should be bent and closely inspected for aphids hiding along the small stem inside the canaryseed head. Also check the stems, underside of leaves, and in the canaryseed boot.

Economic Threshold: 10 to 20 aphids on 50% of the stems prior to the soft dough stage.

Canaryseed Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Aphids	Cygon 480	0.20 L	$4.80	21	A or G	450
	Lagon 480E	0.20 L	$4.55	21	A or G	60
	Malathion 500E/ Fyfanon (canary grass- for seed)	0.56 L	$6.89	14	A or G	1375-2800 3400

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Canola

Scouting Calender

Early-season: Flea beetles, cutworms, red turnip beetle, diamondback moth

Mid-season: Diamondback moth, lygus bug, cabbage seedpod weevil, grasshoppers

Late season: Bertha armyworm, diamondback moth, Lygus bugs, grasshoppers, alfalfa looper

FLEA BEETLES

Typical Damage: Shot-holes in leaves, complete destruction of seedling plants late May through June. Holes chewed in pods in August (occasional).

When and How to Monitor: Monitor May through June when crop is in seedling stage. Examine 10 plants at random at each stop. Estimate overall percentage leaf loss.

Economic Threshold: When 25 percent of leaf surface is destroyed and flea beetles are present. If damage is only along the field margins and beetles are still congregated there, then control measures should be applied to the damaged areas only.

CUTWORMS

Typical Damage: Plants cut off at or near soil surface, some leaf feeding above ground, plants missing from rows, bare patches appearing in field.

When and How to Monitor: Monitor late May to mid-July.

Economic Threshold: none, but use 25-30% stand reduction.

DIAMONDBACK MOTHS

Typical Damage: Flowers clipped or chewed, outer layers of stem and pods chewed, holes chewed in pods.

When and How to Monitor: Monitor late-May through early September. Beat plants within 50 cm x 50 cm area and count larvae on the ground. Multiply by 4 to get the number of larvae per square metre. Do this in at least 5 areas of the field.

Economic Threshold: 100 to 150 larvae/m^2 in immature and flowering fields. 200 to 300 larvae/m^2 in podded canola fields. Note that these threshold numbers are based on stands averaging 150-200 plants/m^2. In areas where stands are thinner, the economic threshold should be lowered accordingly.

LYGUS BUGS

Typical Damage: Attacked buds appear shrunken and bleached white. Damaged seeds appear dark brown and shrivelled.

When and How to Monitor: Monitor from just prior to bud formation until seeds within the pod have become firm. Make 10 180° sweeps with a 37 cm diameter insect net at each sampling site. Sample canola for lygus bugs on a sunny day when the temperature is above 20°C and the crop canopy is dry.

Economic Threshold: 10-18 lygus bugs/10 sweeps from the end of flowering to early pod development in the upper canopy and 15-25 lygus bugs/10 seeps in early pod ripening stage. Controls are not recommended when seeds are ripening (yellow or brown).

BERTHA ARMYWORM

Typical Damage: Outer layers of stems and pods chewed resulting in whitish appearance, holes chewed in pods.

When and How to Monitor: Monitor larvae in late July through early August. Sample at least 3 locations a minimum of 50 metres apart. At each stop, shake plants in a 1/4 m^2 area and carefully check soil surface for dislodged larvae. During heat of the day larvae will often be found under leaves on soil surface. Adult populations can be monitored in June and July using traps baited with a pheromone which attracts the male moths. This determines the risk of a larval infestation occurring latter.

Economic Threshold: 10 to 34 larvae/$yard^2$ (m^2), depending on value of crop and cost of control.

A loss of 0.058 bu/acre for each larva/m^2 can be expected. Yield loss may be greater for canola under moisture stress.

Canola Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Crucifer Flea beetle and/or striped flea beetle	**Early Seeding** and seeding as shallow as soil moisture will allow may prevent economical damage. Planting into **stubble** may reduce feeding damage by flea beetles.					
	Helix	1500 ml/ 100 kg of seed	N/A	Seed Treatment	Seed Treatment	N/A
	Helix Xtra	1500 ml/ 100 kg of seed	N/A	Seed Treatment	Seed Treatment	N/A
	Gaucho Canola System	0.833 L/ 100 kg of seed	N/A	Seed Treatment	Seed Treatment	N/A
	Gaucho Platinum	1.667L/ 100 kg of seed	N/A	Seed Treatment	Seed Treatment	N/A
	Counter 5G	2.2-4.5 kg	$7.61-$15.57	N/A	Granular-applied at seeding	30-142
	Matador	0.034 L	$4.75	50	A or G	64-110
	Decis 5EC	0.04-0.06 L	$3.46-$5.19	14	A or G	395
	Decis 5F		$4.20-$6.30		A or G	15000
	Malathion 500	0.44 L	$5.57	7	A or G	4302
	Malathion 500E/ Fyfanon	0.45-0.71 L	$5.54-$8.73	7	A or G	1375-2800/ 3400
	Furadan	0.06 L	$2.10	60	A or G	7.34
	Sevin XLR Plus	0.2 L	$2.80	Seedling application only	A or G	649
	Cymbush	0.055 L	$3.92	30	A or G	680
	Ripcord	0.02 L	$2.54	30	G	242-542

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Cutworms (Army, dark-sided, redbacked, pale western)	Lorsban/ Nufos/Pyrinex	0.354-0.486 L	\$6.27-\$8.60	21	A or G	272/205/418
	Pounce	0.075-0.158	\$7.59-\$15.20	Treat prior to 6-leaf stage	G	1276
Red Turnip beetle	Furadan	0.11 L	\$3.85	60	A or G	7.34
Diamondback moth	Decis 5EC	0.04-0.06 L	\$3.46-\$5.19	14	A or G	395
	Malathion 500	0.22-0.34 L	\$2.78-\$4.30	7	A or G	4302
	Malathion 500E/ Fyfanon (larvae only)	0.22-0.34 L	\$2.71-\$4.18	7	A or G	1375-2800/ 3400
	Dylox	1.11L	\$19.26	21	A or G	950
	Lorsban/ Nufos/Pyrinex (for larval control only)	0.405 L	\$7.17	21	A or G	272/205/418
Lygus Bugs	Matador	0.034 L	\$4.75	50	A or G	64-110
	Dylox	0.55 L	\$9.54	21	A or G	950
	Lorsban/Nufos/ Pyrinex	0.405 L	\$7.17	21	A or G	272/205/418
	Gaucho Platinum (suppression only)	1.667L/ 100 kg of seed	N/A	Seed Treatment	Seed Treatment	N/A
Cabbage seedpod weevil	Gaucho Platinum (suppression of larvae only)	1.667L/ 100 kg of seed	N/A	Seed Treatment	Seed Treatment	N/A
	Matador	0.034 L	\$4.75	50	A or G	64-110
Bertha Armyworm	**Seeding as early as possible** and choosing early maturing varieties of canola may help minimize damage in years when outbreaks are forecasted.					
	Decis 5EC	0.04-0.06 L	\$3.46-\$5.19	14	A or G	395
	Monitor	0.23-0.5 L	\$7.24-\$15.74	10	A or G	17
	Lannate	0.0874-0.2064 kg	\$6.29-\$14.86	8	A or G	30-34
	Lorsban/Nufos/ Pyrinex	0.304-0.405 L	\$5.38-\$7.17	21	A or G	272/205/418
	Cymbush	0.08-0.113 L	\$5.71-\$8.06	30	A or G	680
	Ripcord	0.028 L (ground) 0.036 L (air)	\$3.56 (ground) -\$4.57 (air)	30	A or G	242-542
Turnip aphid	Cygon 480	0.34-0.36 L	\$8.16-\$8.64	21	A or G	450
	Lagon	0.34-0.36 L	\$7.74-\$8.19	21	A or G	60
	Gaucho Platinum (suppression only)	1.667L/ 100 kg of seed	N/A	Seed Treatment	Seed Treatment	N/A

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Cabbage root maggot	**Increased seeding rates and increased row spacings** (to about 25 to 30 cm) can reduce damage to the roots by root maggots.					
	Counter 5G (suppression of root maggot)	2.2-4.5 kg	$7.61-$15.57	N/A	Granular-applied at seeding	30-142
Grasshoppers	Eco bran bait	0.8-1.6 kg	$2.80-$5.60	Treat only seedlings	G	N/A
	Matador (young grasshoppers only)	0.026-0.034 L	$3.63-$4.75	50	A or G	64-110
	Malathion 500	0.45-0.69 L	$5.57-$8.60	7	A or G	4302
	Malathion 500E/ Fyfanon	0.45-0.71 L	$5.54-$8.73	7	A or G	1375-2800
	Ripcord (young grasshoppers only)	0.02-0.028 L	$2.54 -$3.56	30	G	242-542
	Monitor	0.5 L	$15.74	10	A or G	17
	Lorsban/Nufos/ Pyrinex	0.235-0.354 L	$4.16-$6.27	21	A or G	272/205/418
	Cygon 480	0.34-0.36 L	$8.16-$8.64	21	A or G	450
	Lagon	0.34-0.36 L	$7.74-$8.19	21	A or G	60
Alfalfa looper	Lannate	0.087-0.206 kg	$6.29-$14.86	8	A or G	30-34
	Lorsban/Nufos/ Pyrinex	0.304-0.405 L	$5.38-$7.17	21	A or G	272/205/418
Beet webworm	Decis 5EC	0.04-0.06 L	$3.46-$5.19	14	A or G	395
	Dylox	0.607 L	$10.58	21	A or G	950
	Lannate	0.0874-0.2064 kg	$6.29-$14.86	8	A or G	30-34
Aster leafhopper	Cygon 480	0.34-0.36 L	$8.16-$8.64	21	A or G	450
	Lagon	0.34-0.36 L	$7.74-$8.19	21	A or G	60
Clover cutworm	Decis 5EC	0.04-0.06 L	$3.46-$5.19	14	A or G	395
	Lannate	0.0874-0.2064 kg	$6.29-$14.86	8	A or G	30-34
Variegated cutworm	Lorsban/Nufos/ Pyrinex	0.354-0.486 L	$6.27-$8.60	21	A or G	272/205/418
True armyworm	Lorsban/Nufos/ Pyrinex	0.304-0.405 L	$5.38-$7.17	21	A or G	272/205/418

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[1] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

Field Scouting in Corn

CUTWORMS

Typical Damage: Plants cut off at or near soil surface, some leaf feeding above ground, plants missing from rows, bare patches appearing in filed.

When and How to Monitor: At each stop, examine 100 plants in a row. Calculate percentage of plants cut off or showing leaf feeding.

Economic Threshold: When 3% of plants are cut.

EUROPEAN CORN BORERS

Typical Damage: Shot-holes in leaves, holes in stalk, tassels and ears.

When and How to Monitor: Field scouting should begin in early July. Older fields should be scouted first. At 10 locations, examine 10 plants for egg masses and signs of shot-holing. Calculate percentage of plants with shot-holes. Scout every 5 to 7 days until the end of July or larvae start to tunnel into the stalks.

Economic Threshold: When 50% of the plants have shot-holes in the laves, caused by young corn borers.

Corn Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Seed corn maggot	Agrox B-3	0.08 kg/ 25 kg of seed	$3.69/ 25 kg of seed	Seed Treatment	Seed Treatment	N/A
	Agrox D-L Plus	0.05 kg/ 25 kg of seed	$2.60/ 25 kg of seed	Seed Treatment	Seed Treatment	N/A
	Diazinon 50W	0.020 kg/ 300 mL water/ 4L of seed	$0.40/ 4 L of seed	Seed Treatment	G	1960
	Counter 15 G	0.075 kg/ 100 m row (minimum 75 cm row spacing)	$0.38/ 100m of row	Granular Insecticide	Applied at planting time	11.7
Wireworms	Counter 15G	0.075 kg/ 100 m row (minimum 75 cm row spacing)	$0.44/ 100m of row	Granular Insecticide	Applied at planting time	11.7
	Agrox B-3	0.08 kg/ 25 kg of seed	$3.69/ 25 kg of seed	Seed Treatment	Seed Treatment	N/A
	Agrox D-L Plus	0.05 kg/ 25 kg of seed	$2.60/ 25 kg of seed	Seed Treatment	Seed Treatment	N/A
European Corn Borer	Cultivars of Bt corn are resistant to feeding by European corn borer. If using cultivars of Bt corn, a refuge of at least 20% of the corn acres planted to non-Bt cultivars should be planted to reduce the odds of European corn borer developing resistance to Bt corn.					
	Dipel 2X DF	0.23-0.45 kg	$20.33-$39.78	0	G	>4,000
	Matador	0.034 L	$4.75	1 (sweet corn), 14 (silage)	A or G	64-110
	Decis 5EC (field corn)	0.1-0.12 L	$8.65-$10.38	Max. 3 applications per year	G only	395
	Cymbush	0.113 L	$8.06	5	A or G	680
	Ripcord	0.07 L	$8.89	5	A or G	242-542
	Malathion 500E/ Fyfanon	0.91-1.11 L	$11.19-$13.65	5	A or G	1375-2800/ 3400

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
	Lannate (sweet corn only)	0.253 kg	$18.22	See product label		30-34
	Furadan	0.445 L	$15.17	7	A or G, see label restrictions	7.34
	Sevin XLR Plus	1.01-1.6 L	$14.14-$22.40	1	A or G	649
	Pounce (sweet corn)	0.11-0.15 L	$11.14-$15.20	1	A or G	1030
Corn Earworm	Matador	0.034 L	$4.75	1 (sweet corn), 14 (silage)	A or G	64-110
	Malathion 500E/ Fyfanon	0.91-1.11 L	$11.19-$13.65	5	A or G	1375-2800/ 3400
	Thionex	1.11-1.62 L	$16.10-$23.49	50	G	110
	Thiodan	1.11-1.72 L	$17.09-$26.49	50	G	N/A
	Ripcord	0.07 L	$8.89	5	A or G, see product label	242-542
	Sevin XLR Plus	1.01-1.6 L	$14.14-$22.40	1	A or G	649
	Lannate (sweet corn only)	0.174-0.253 kg	$12.53-$18.22	See product label	See product label	30-34
	Pounce (sweet corn)	0.11-0.15 L	$11.14-$15.20	1	A or G	1030
True Armyworm	Dylox	0.61-1.11 L	$10.58-$19.26	1	A or G	950
	Methoxychlor 240	2.83-4.55 L	$79.81- $128.31	7	G	5,000-7,000
Corn leaf aphid	Pirimor (sweet corn only)	0.220 kg	$21.44	3	A or G	100-200
	Thiodan/Thionex	1.11 L	$17.09	50	G	110
	Lannate (sweet corn only)	0.430-0.620 kg	$30.96-$44.64	5	G	30-34
Grasshoppers	Eco bran bait	0.8-1.6 kg	$2.80-$5.60	1	G	N/A
	Sevin XLR Plus	0.50-1.01 L	$7.00-$14.14	1	A or G	649
Cutworms	Matador	0.034 L	$4.75	1 (sweet corn) 14 (silage)	A or G	64-110
	Dylox	0.61-1.11 L	$10.58-$19.26	1	A or G	950
	Lorsban/Nufos/ Pyrinex (dark sided, black, redbacked)	0.971 L (Pre-plant treatment), 0.486-0.971 L (seedling treatment)	Pre-plant treatment- $17.19; Seedling treatment- $8.60-$17.19	70	G	272/205/418
	Pounce (Army, black, dark-sided, pale western, red-backed, white)	0.07-0.16 L	$7.09-$16.20	N/A	G	1030

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
	Ripcord (black, white, darksided, redbacked, army, pale western)	0.07 L	$8.89	21	G	242-542
Fall armyworm	Matador	0.034 L	$4.75	1 (sweet corn) 14 (silage)	A or G	64-110
	Pounce	0.073 L	$7.39	1	G	1030

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Field Scouting in Flax

APHIDS

Typical Damage: Wilting of plants, plants are sticky.

When and How to Monitor: Monitor mid-July to mid-August. Check 10 plants at each stop. Record total number of aphids and calculate average per plant.

Economic Threshold: Three or more aphids per main stem at full flower or 8 or more aphids per main stem at green boll stage.

CUTWORMS

Typical Damage: Plants cut off at or near soil surface, some leaf feeding above ground, plants missing from rows, bare patches appearing in field.

When and How to Monitor: Monitor late May to mid-July. At each stop, check several 1 yard^2 (m^2) areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae.

Economic Threshold: 3-4/m^2

BEET WEBWORM

Economic Threshold: >10 larvae/m^2

FLAX BOLLWORM

Economic Threshold: 3% of flax bolls infested

Flax Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Potato Aphid	Cygon 480	0.18 L	$4.32	21	A or G	450
	Lagon	0.18 L	$4.10	21	A or G	60
Grasshoppers	Decis 5F	0.032-0.048 L	$3.36-$5.04	40	A or G	15,000
	Decis 5EC	0.04-0.06 L	$3.46-$5.19	40	A or G	395
	Matador (young grasshoppers only)	0.026-0.034 L	$3.64-$4.75	50	A or G	64-110
	Malathion 500	0.44-0.68 L	$5.57-$8.60	7	A or G	4302
	Malathion 500E/ Fyfanon	0.45-0.71 L	$5.54-$8.73	7	A or G	1375-2800/ 3400
Cutworms (Army, dark-sided, redbacked, pale western)	Decis 5EC	0.08 L	$6.92	40	A or G	395
	Lorsban/Nufos/ Pyrinex	0.354-0.486 L	$6.27-$8.60	21	A or G	272/205/418
	Pounce	0.075-0.158 L	$7.60-$16.01	Treat prior to 6 leaf stage	G	1030

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Wireworm	Vitavax Dual Powder	70g/ 25 kg seed	$3.43 to treat 25 kg of seed	N/A	Seed Treatment	N/A
True Armyworm	Dylox	0.61 L	$10.58	21	A or G	950
	Lorsban/Nufos/ Pyrinex	0.354-0.486 L	$6.27-$8.60	21	A or G	272/205/418
Bertha Armyworm	Dylox	1.11 L	$19.26	21	A or G	950
	Lannate	0.089-0.109 kg	$6.41-$7.87	8	A or G	30-34
	Lorsban/Nufos/ Pyrinex	0.304-0.405 L	$5.38-$7.17	21	A or G	272/205/418
Clover Cutworm	Decis 5EC	0.04-0.06 L	$3.46-$5.19	40	A or G	395
Variegated cutworm	Lorsban/Nufos/ Pyrinex	0.354-0.486 L	$6.27-$8.60	21	A or G	272/205/418
Beet Webworm	Decis 5EC	0.04-0.06 L	$3.46-$5.19	40	A or G	395
	Dylox	0.61-1.11 L	$10.58-$19.26	21	A or G	950
Clover Cutworm	Decis 5EC	0.04-0.06 L	$3.36-$5.04	40	A or G	395

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Forage Grasses (Timothy, etc.) Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Grasshoppers	Eco bran bait	0.8-1.6 kg	$2.80-5.60	1-2	G	N/A
	Malathion 500	0.69 L	$8.60	7	A or G	4302
	Sevin XLR Plus	0.49-0.93 L (for nymphs or sparse vegetation) 0.93-1.42 L (for adults or application to dense vegetation)	$6.86-$13.02 $13.02-$19.88	1	A or G	649
	Cygon	0.17 L (young) 0.34 L (adult)	$4.08 $8.16	2 7	A or G	450
	Lagon	0.17-0.22 L	$3.87-$5.01	2	A or G	60
European skipper (on timothy)	Dipel 2X DF	57-111 g	$5.01-$9.83	N/A	A or G	>4,000

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Lentil Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Grasshoppers	Decis 5F	0.032-0.048 L (ground) 0.048 L (air)	\$3.36-\$5.04	30	A or G	15000
	Decis 5EC	0.04-0.06 L (ground) 0.06 L (air)	\$3.46-\$5.19	30	A or G	395
	Malathion 500	0.68 L	\$8.60	30	A or G	4302
	Malathion 500E/ Fyfanon	0.69 L	\$8.49	14	A or G	1375-2800 3400
	Lorsban/Nufos/ Pyrinex	0.235-0.486 L	\$4.16-\$8.60	21-60	A or G	272/205/418
Cutworms (Army, black, dark-sided, pale western, red-backed, white)	Decis 5EC	0.08 L	\$6.92	30	A or G	395
	Pounce	0.075-0.158 L	\$7.60-\$16.00	Treat prior to 6-leaf stage	G	1030
	Lorsban/Nufos/ Pyrinex (for pale western cutworm only)	0.354-0.486 L	\$6.26-\$8.60	21-60	A or G	272/205/418

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Mustard Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Flea beetles	Helix	1500 ml/ 100 kg of seed	N/A	Seed Treatment		N/A
	Helix Xtra	1500 ml/ 100 kg of seed	N/A	Seed Treatment		N/A
	Gaucho Canola System	0.833 L/ 100 kg of seed	N/A	Seed Treatment		N/A
	Gaucho Platinum	1.667 L/ 100 kg of seed	N/A	Seed Treatment		N/A
	Counter 5G	2.2-4.5 kg	\$7.61-\$15.57	Granular insecticide		30-142
	Matador	0.034 L	\$4.75	50	A or G	64-110
	Decis 5F	0.04-0.06 L	\$4.20-\$\$6.30	14	A or G	15,000
	Decis 5EC	0.04-0.06 L	\$3.46-\$5.19	14	A or G	395
	Cymbush	0.055 L	\$3.92	30	G	680
	Malathion 500E/ Fyfanon	0.45-0.71 L	\$5.54 -\$8.73	7	A or G	1375-2800/ 3400
	Furadan 480F	0.06 L	\$2.10	7	A or G	7.34

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Bertha Armyworm	Decis 5EC	0.04-0.06 L	$3.46-$5.19	14	A or G	395
	Cymbush	0.08-0.113 L	$5.71-$8.06	30	G	680
Diamondback Moth	Decis 5 EC	0.04-0.06 L	$3.46-$5.19	14	A or G	395
	Malathion 500E/ Fyfanon	0.22-0.34 L	$2.71-$4.18	7	A or G	1375-2800/ 3400
Grasshoppers	Matador (young grasshoppers only)	0.026-0.034 L	$3.64-$4.75	50	A or G	64-110
	Malathion 500E/ Fyfanon	0.45-0.71 L	$5.54-$8.73	7	A or G	1375-2800/ 3400
Clover Cutworm	Decis 5EC	0.04-0.06 L	$3.46-$5.19	14	A or G	395
Beet webworm	Decis 5EC	0.04-0.06 L	$3.46-$5.19	14	A or G	395
Red Turnip Beetle	Furadan 480F	0.11 L	$3.85	21	A or G	7.34
Root Maggot	Counter 5G (suppression)	2.2-4.5 kg	$7.61-$15.57	Granular insecticide	Applied at planting time	30-142

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Oats – See small grains

Grasshopper Management on **Pastures, Rangelands, Hay, Headlands, and Roadsides**

Note: Insects for biological control of weeds such as leafy spurge may be introduced and established in some areas of Manitoba and Saskatchewan. If grasshopper numbers become high, consider using control strategies and insecticides that will minimize harm to these biological control agents.

Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Grasshoppers on rangelands may be effectively managed by applying certain insecticides in 30 metre swaths, alternating with 30 metre untreated swaths. For more information on managing grasshoppers by this method see: www.sdvc.uwyo.edu/grasshopper/raats.htm					
Eco bran bait (pastures, rangelands, field borders, headlands, right-of-way, roadsides, wastelands)	0.8-1.6 kg	$2.80-$5.60	0-2 (see label)	G	N/A
Decis 5F (Rangeland, pastures, roadsides)	0.032-0.048	$3.36-$5.04	1 (beef cattle) Dairy cattle must not be fed or grazed on Decis-treated crops	A or G	15,000

Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Decis 5EC (Rangeland, pastures, roadside, fence row)	0.04-0.06 L	\$3.46-\$5.19	1 (beef cattle) Dairy cattle must not be fed or grazed on Decis 5EC treated crops.	A or G	395
Ripcord (Roadsides, headlands, and summerfallow) (young grasshoppers only)	0.02-0.028 L	\$2.54-\$3.55	Treated areas must not be grazed or cut or hay.	G	242-542
Matador (Unimproved pasture, summerfallow) (young grasshoppers only)	0.026-0.034 L	\$3.63-\$4.75	14	A or G	64-110
Malathion 500E (pastures, rangelands) (young grasshoppers only)	0.69 L	\$8.49	Do not apply to fields occupied by dairy animals, but may be grazed or harvested on the day of application.	A or G	1375-2800
Malathion 500 (Hay only)	0.69 L	\$8.73	7	A or G	4302
Sevin XLR plus (ditchbanks, field borders, headlands, pastures, rangelands, right-of-way, wastelands)	0.48-1.41 L	\$6.72-\$19.74	0 (ditchbanks, field borders, headlands, right-of-way, wasteland); 1 (pastures, rangeland)	A or G	649
Lagon 480E (pasture, wasteland, rangelands)	0.22 L (nymphs) 0.34-0.40 L (Adults)	\$5.01 \$7.74-\$9.10	2 days- 0.22L rate 7 days- 0.34L rate 28 days- 0.40L rate	A or G	60
Hay	0.17-0.22 L	\$3.87-\$5.01	2		
Cygon (pasture, wasteland)	0.17-0.34 L	\$4.08-\$8.16	2-7	A or G	450

Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Diazinon (Rangeland, pasture, ditch banks, roadsides, fence rows, wasteland)	0.445 L (Diazinon 500E and 500EC) 0.445 kg (Diazinon 50W)	$6.45 (500 E) $6.94 (500 EC) $9.03 (50W)	Do not spray livestock directly. Dairy and Beef cattle and sheep may be grazed or fed green forage immediately following application. Hay may be fed if not cut for 21 says following application.	G	1500 (500 E) 1960 (50W)
Dibrom (Rangeland and pastures)	0.22-0.34 L (young grasshoppers) 0.28-0.4 L (adult grasshoppers)	$8.00-$12.36 (young) $10.19-$14.55 (adult)	Animals may be present during treatment	A or G	345
Lorsban/Nufos/Pyrinex	Ungrazed and unoccupied areas such as roadsides, right of way, and fence lines adjacent to barley, wheat, oats, or canola, and lentils.			A or G	272/205/418

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Peas

APHIDS

When and How to Monitor: Monitor when field peas begin to flower. Take 180° sweeps or check 10 8-inch (20 cm) plant tips at each stop. Record total number of aphids and calculate average per sweep or plant tip.

Economic Threshold: If, at the beginning of flowering, there are 9 to 12 aphids per sweep or 2-3 aphids per 8-inch (20 cm) plant tip, an insecticide application when 50 percent of plants have produced some young pods will be cost-effective.

Peas Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Pea Aphid	Pirimor	0.06-0.110 kg	$5.85-$10.72	6	A or G	100-200
	Malathion 500E/ Fyfanon	0.91 L	$11.19	3	A or G	1375-2800/ 3400
	Lannate	0.206 kg	$14.86	1	G	30-34
	Cygon	0.11-0.17 L	$2.64-$4.08	3	A or G	450
	Lagon	0.11-0.17 L	$2.50-$3.87	3	A or G	60
	Di-Syston	3.0-7.1 kg	$21.90-$51.83	50	G (at planting)	14-52
Cutworms (Army, black, dark-sided, pale western, redbacked, white)	Pounce	0.075-0.158 L	$7.60-$16.01	Treat prior to 6 leaf stage	G	1030
Seedcorn Maggot	Agrox B-3	See fungicide section of guide	$3.69 to treat 25 kg of seed	Seed Treatment	Seed Treatment	N/A
	Agrox D-L Plus	0.05kg/ 25kg seed	$2.60 to treat 25 kg of seed	Seed Treatment	Seed Treatment	N/A
	Diazinon 50W	20g/ 300 ml water/ 4L seed	$0.40 to treat 4L of seed	Seed Treatment	Seed Treatment	1960
Wireworm	Agrox B-3	See fungicide section of guide	$3.69 to treat 25 kg of seed	Seed Treatment	Seed Treatment	N/A
	Agrox D-L Plus	0.05 kg/ 25 kg seed	$2.60 to treat 25 kg of seed	Seed Treatment	Seed Treatment	N/A
Leafhoppers	Malathion 500E/ Fyfanon	0.91 L	$11.19	3	A or G	1375-2800/ 3400
	Di-Syston	3.0-7.1 kg	$21.90-$51.83	50	G	14-52
Alfalfa Looper	Lannate	0.206 kg	$14.86	1	G	30-34
	Sevin	1.90 L	$26.60	3	G	649
Spider mites	Malathion 500E/ Fyfanon	0.91 L	$11.19	3	A or G	1375-2800/ 3400

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Potatoes Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
Colorado potato beetle	Note: Colorado potato beetles have been found to be resistant to several families of insecticides in localized areas of Manitoba. Rotation between different families of insecticides is essential.					
	Admire (N)	0.345 -0.525 L	In furrow: $103.89-$158.85	7	G	4143-4870
		0.080 L	Foliar: $24.16			
	Pounce (P)	0.075 -0.10 L	$7.60-$10.13	1	G	1276
	Matador* (P)	0.034-0.050 L	$4.75-$6.99	7	A or G	64-110
	Decis 5EC* (P)	0.04 -0.06 L	$3.46-$5.19	3	A or G	395
	Cymbush** (P)	0.055 L	$3.92	7	A or G	680
	Ripcord** (P)	0.025-0.05 L	$3.18-$6.35	7	A or G	242-542
	Furadan (C)	0.222 L	$7.77	7	G	7.34
	Sevin (C)	0.50 L	$7.00	7	A or G	649
	Diazinon (OP)	0.445 L (500E)	$6.45	14	G	1500
		0.445 L (500 EC)	$6.94			NA
		0.445 kg (50 W)	$9.04			1960
	Thimet (OP)	0.14 kg in sandy soils 0.215 kg in heavy soils	$0.78-$1.19/ 100m row	90	G	27-31
	Di-Syston (OP)	0.15-0.2 kg/ 110 yard (100 m) row	$34.50-$46.00	90	G	14-52
	Monitor (OP)	0.71-0.91 L	$22.35- $28.65	14	A or G	17
	Guthion SC (OP)	0.70 L	$11.20	7	A or G	21-37
	Guthion 50/ Sniper (OP)	0.34 kg	$9.90	7	A or G	12.3-24.7/7
	Malathion 500 (OP)	056-0.80 L	$7.08-$10.12	3	A or G	4302
	Malathion 500E/ Fyfanon** (OP)	0.61-0.91 L	$7.50-$11.19	3	A or G	1375-2800/ 3400
	Dibrom* (OP)	0.44 L	$16.01	4	A or G	345
	Imidan* (OP)	0.91 kg	$19.40	7	G	285
	Lorsban*/ Nufos**/ Pyrinex* (larvae only) (OP)	0.405 L	$7.08-$7.16	7	G	205/272/418
	Endosulfan (OC)	0.45-0.61 kg	$10.58-$14.35	1	G	110
	Thiodan (OC)	0.6-0.8 L	$9.24-$12.32	1	G	107.2
	Thionex (OC)	0.6-0.8 L	$8.70-$11.60	2	G	110

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
	Methoxychlor (OC)	1.21-3.64 L	$34.12-$102.65	7	G	5000-7000
	Novodor FC (B)	4.0-8.0 L	NA	1	G	74, 000
Aphid	Admire 240 F	Soil Application: 0.344-0.526 L (based on 90 cm row spacing). Foliar Application: 0.081 L	Soil Application: $103.89-$158.85 Foliar Application: $24.16	7 (foliar application)	G	4143-4870
	Thimet	0.14 kg in sandy soils 0.215 kg in heavy soils	$0.78-$1.19/ 100m row	90	G	27-31
	Di-Syston	0.15-0.2 kg/ 110 yard (100 m) row	$34.50-$46.00	90	G	14-52
	Cygon	0.22-0.44 L	$5.28-$10.56	7	G	450
	Lagon	0.22-0.44 L	$5.05-10.01	7	G	60
	Diazinon	0.445 L (500E)	$6.45	14	G	1500
		0.445 L (500 EC	$6.94			NA
		0.445 kg (50 W)	$9.03			1960
	Endosulfan	0.45-0.61 kg	$10.59-$14.35	1	G	110
	Thiodan	0.6-0.8 L	$9.24-$12.32	1	G	107.2
	Thionex	0.6-0.8 L	$8.70-$11.60	2	G	110
	Monitor	0.71-0.91 L	$22.35- $28.65	14	A or G	17
	Malathion 500	056-0.80 L	$7.08-$10.12	3	Aor G	4302
	Malathion 500E/ Fyfanon**	0.61-0.91 L	$7.50-$11.19	3	A or G	1375-2800/ 3400
	Imidan*	0.91 kg	$19.40	7	G	285
	Lannate*	0.2185 kg	$15.73	3	G	30-34
	Orthene**	0.30-0.44 kg	$27.45-$40.26	21	G	1030-1447
	Pirimor**	0.170-0.220 kg	$16.56-$21.44	7	A or G	100-200
Flea Beetles	Admire 240 F (suppression)	Soil Application: 0.344-0.526 L (based on 90 cm row spacing).	$103.89-$158.85	NA	G	4143-4870
	Thimet (reduction of Flea beetles)	0.14 kg in sandy soils 0.215 kg in heavy soils	$0.78-$1.19/ 100m row	90	G	27-31

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)^2
	Di-Syston	0.15-0.2 kg/ 110 yard (100 m) row	\$34.50-\$46.00	90	G	14-52
	Pounce	0.075-0.10 L	\$7.60-\$10.13	1	G	1276
	Diazinon	0.445 L (500E)	\$6.45	14	G	1500
		0.445 L (500 EC)	\$6.94			NA
		0.445 kg (50 W)	\$9.04			1960
	Monitor	0.71-0.91 L	\$22.35-\$28.65	14	A or G	17
	Guthion SC	0.91-1.41 L	\$14.56-\$22.56	7	A or G	21-37
	Guthion 50 Solupak WP	0.45-0.70 kg	\$13.10-\$20.37	7	A or G	12.3-24.7
	Sevin	0.50 L	\$7.00	7	A or G	649
	Furadan	0.222 L	\$7.77	7	G	7.34
	Endosulfan	0.45-0.61 kg	\$10.59-\$14.35	1	G	110
	Thiodan	0.6-0.8 L	\$9.24-\$12.32	1	G	107.2
	Thionex	0.6-0.8 L	\$8.70-\$11.60	2	G	110
	Methoxychlor	1.21-3.64 L	\$34.12-\$102.65	7	G	5000-7000
	Matador*	0.034-0.050 L	\$4.75-\$6.99	7	A or G	64-110
	Decis 5EC*	0.04 -0.06 L	\$3.46-\$5.19	3	A or G	395
	Dibrom*	0.44 L	\$16.01	4	A or G	345
	Imidan*	0.91 kg	\$19.40	7	G	285
	Lannate*	0.2185 kg	\$15.73	3	G	30-34
	Lorsban*/ Nufos**/ Pyrinex*	0.405 L	\$7.17	7	G	205/272/418
	Orthene**	0.30-0.44 kg	\$27.45-\$40.26	21	G	1030-1447
	Cymbush**	0.055 L	\$3.92	7	A or G	680
	Ripcord**	0.025-0.05 L	\$3.18-\$6.35	7	A or G	242-542
Leafhoppers	Admire 240F	Soil Application: 0.344-0.526 L (based on 90 cm row spacing).	\$103.89-\$158.85	NA	G	4143-4870
	Pounce	0.075-0.10 L	\$7.59-\$10.13	1	G	1276
	Cygon	0.22-0.44 L	\$5.28-\$10.56	7	G	450
	Lagon	0.22-0.44 L	\$5.00-\$10.01	7	G	60
	Cymbush**	0.055 L	\$3.92	7	A or G	680
	Decis 5EC*	0.04 -0.06 L	\$3.46-\$5.19	3	A or G	395

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)^{2}
	Diazinon	0.445 L (500E)	$6.45	14	G	1500
		0.445 L (500 EC)	$6.94			NA
		0.445 kg (50 W)	$9.03			1960
	Dibrom*	0.44 L	$16.01	4	A or G	345
	Di-Syston	0.15-0.2 kg/ 110 yard (100 m) row	$34.50-$46.00	90	G	14-52
	Endosulfan	0.45-0.61 kg	$10.59-$14.35	1	G	110
	Thiodan	0.6-0.8 L	$9.24-$12.32	1	G	107.2
	Thionex	0.6-0.8 L	$8.70-$11.60	2	G	110
	Furadan	0.445 L	$15.58	7	G	7.34
	Guthion SC	0.91-1.41 L	$14.56-$22.56	7	A or G	21-37
	Guthion 50 Solupak WP	0.45-0.70 kg	$13.10-$20.37	7	A or G	12.3-24.7
	Imidan*	0.91 kg	$19.40	7	G	285
	Lannate*	0.2185 kg	$15.73	3	G	30-34
	Malathion 500	056-0.80 L	$7.08-$10.12	3	A or G	1375-2800
	Malathion 500E/ Fyfanon**	0.61-0.91 L	$7.50-$11.19	3	A or G	1375-2800
	Matador*	0.034-0.050 L	$4.75-$6.99	7	A or G	64-110
	Methoxychlor	1.21-3.64 L	$34.12-$102.65	7	G	5000-7000
	Monitor	0.71-0.91 L	$22.35- $28.65	14	A or G	17
	Orthene**	0.30-0.44 kg	$27.45-$40.26	21	G	1030-1447
	Ripcord**	0.025-0.05 L	$3.18-$6.35	7	A or G	242-542
	Sevin	0.50 L	$7.00	7	A or G	649
	Thimet	0.14 kg in sandy soils 0.215 kg in heavy soils	$0.78-$1.19/ 100m row	90	G	27-31
Lygus bugs	Pounce	0.075-0.10 L	$7.60 = $10.13	1	G	1276
	Cymbush**	0.08 L	$5.71	7	A or G	680
	Decis 5EC*	0.04 -0.06 L	$3.46-$5.19	3	A or G	395
	Endosulfan	0.45-0.61 kg	$10.59-$14.35	1	G	110
	Thiodan	0.6-0.8 L	$9.24-$12.32	1	G	107.2
	Thionex	0.6-0.8 L	$8.70-$11.60	1	G	110
	Furadan	0.445 L	$15.58	7	G	7.34
	Guthion SC	0.91-1.41 L	$14.56-$22.56	7	A or G	21-37
	Guthion 50 Solupak WP	0.45-0.70 kg	$13.10-$20.37	7	A or G	12.3-24.7
	Lagon	0.22-0.44 L	$5.00-$10.01	7	G	60

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[2]
	Lorsban*/ Nufos**/ Pyrinex* (larvae only)	0.405 L	$7.17	7	G	205/272/418
	Matador*	0.034-0.050 L	$4.75-$6.99	7	A or G	64-110
	Orthene**	0.30-0.44 kg	$27.45-40.26	21	G	1030-1447
	Ripcord**	0.05 L	$6.35	7	A or G	242-542
	Sevin	2.12-2.59 L	$29.68-$3.26	7	A or G	649
European Corn Borer	Guthion SC	0.91-1.41 L	$14.56-$22.56	7	A or G	21-37
	Guthion 50 Solupak WP	0.45-0.70 kg	$13.10-$20.37	7	A or G	12.3-24.7
	Sevin	1.01-2.59 L	$14.14-$36.26	7	A or G	649
Blister beetle	Methoxychlor	1.21-3.64 L	$34.12-$102.65	7	G	5000-7000
Cutworms (Army, darksided, pale western, Redbacked, black, white)	Pyrinex*/ Nufos**/ Lorsban* (Redbacked, black, and darksided cutworms only)	0.971 L (pre-plant) 0.486-0.971 L (seedling)	$17.19 (pre-plant) $8.50 -$17.19 (seedling treatment)	7	G	418/205/272
	Pounce	0.075-0.158 L	$7.60-$15.20	Treat prior to 6-leaf stage	G	1276
	Ripcord**	0.07 L	$8.89	21	G	242-542
Wireworms	Thimet	0.14 kg in sandy soils 0.215 kg in heavy soils	$0.78-$1.19/ 100m row	At planting application. Do not harvest before 90 days after planting time.	G	27-31
Variegated cutworm	Pounce	0.075 L	$ 7.60	1	G	1276
	Ripcord**	0.07 L	8.89	7	G	242-542
	Sevin	0.1-0.125 L/ 300 m of row	$1.40-$1.75/300 m of row	7	A or G	649

*Not an approved product by Midwest Food Products Inc.
**Not an approved product by Midwest Food Products Inc. and McCain Foods (Canada).

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] Family of Insecticide: N=Neonicotinoids, P=Pyrethroids, C=Carbamates, OP=Organophosphates, OC=Organochlorines, B=Biological.

[2] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Rye

CUTWORMS

Typical Damage: Plants cut off at or near soil surface, some leaf feeding above ground, plants missing from rows, bare patches appearing in field.

When and How to Monitor: Monitor late May to mid-July. At each stop, check several 1 m^2 areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae.

Economic Threshold: 3-4/m^2

APHIDS

Typical Damage: Visible wilting of plants, yellow patches in fields, plants are sticky.

When and How to Monitor: Monitor July through early August. Check 20 stems in each of 5 areas. Counts should be at least 50 paces apart, and observations should be made well into the center of the field. Too frequently farmers become alarmed after checking a few plants along the margins, especially near shelterbelts, where populations are high. Record the total number of aphids and calculate the average per plant.

Economic Threshold: 12-15 aphids/stem until about 2 weeks after flowering.

ARMYWORMS

Typical Damage: Leaves stripped from plants, awns chewed from heads, heads clipped.

When and How to Monitor: Monitor mid-June through July. At each stop shake plants in 1 yard^2 (m^2) area and carefully check soil surface for dislodged larvae.

Economic Threshold: 10 larvae/m^2. For migrating Armyworms: Treat a couple of swaths ahead of the infestation in the direction of movement to form a barrier strip.

Rye Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Grasshoppers	Eco bran bait	0.8-1.6 kg	\$2.80-\$5.60	14	G	N/A
	Malathion 500E	0.91-1.11 L	\$11.19-\$13.65	7	A or G	1375-2800
	Malathion 500	0.69 L	\$8.60	7	A or G	4302
	Guthion (Borders Only)	0.44-0.70 L (Guthion SC) 0.21-0.34 kg (Guthion 50 Solupak WP)	\$7.04-\$11.20 (Guthion SC) \$6.11-\$9.89 (Guthion 50 Solupak WP)	30	A or G	21-37/ 12.3-24.7
	Sniper	0.21-0.34 kg	\$6.11-\$9.89	30	A or G	12.3-24.7
	Sevin XLR Plus	0.50-1.01 L	\$7.00-\$14.14	14	A or G	649
	Lagon 480E	0.22-0.40 L	\$5.01-\$9.10	2	A or G	60
Cutworms (Army, black, darksided, pale western, redbacked, white)	Pounce	0.075-0.158 L	\$7.60-\$15.20	Treat pior to 6 leaf stage	G	1030
Aphids	Malathion 500	0.60-0.80 L	\$7.59-\$10.12	7	A or G	4302
	Malathion 500E/ Fyfanon	0.45-1.11 L	\$5.54-\$13.65	7	A or G	1375-2800/ 3400
True armyworm	Malathion 500	0.60-0.80 L	\$7.59-\$10.12	7	A or G	4302
	Malathion 500E/ Fyfanon	0.45-1.11 L	\$5.54-\$13.65	7	A or G	1375-2800/ 3400
	Sevin XLR Plus	1.01-2.12 L	\$14.14-\$29.68	14	A or G	649
	Methoxychlor	2.83-4.55 L	\$79.81-\$128.31	7	G	5,000-7,000

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Wireworms	DB-Green L	65 mL/ 25 kg of seed	$1.25/ 25 kg of seed	Seed Treatment		N/A
	N-M dual purpose	56g/ 25 kg seed	$1.26/25 kg seed	Seed Treatment		N/A
	Vitavax dual powder/Vitavax dual solution	60g/ 25 kg seed (powder) 75ml/25 kg seed (solution)	$2.90 (solution) $2.94 (powder) Cost per 25 kg of seed	Seed Treatment		N/A

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[1] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$

Safflower Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
Grasshoppers	Lagon	0.22-0.40 L	$5.01-$9.10	21	A or G	60

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[1] LD$_{50}$ values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD$_{50}$.

Field Scouting in Small Grains (wheat, barley, oats)

GRASSHOPPERS

Typical Damage: Black strips along margins of newly emerging crops, head clipping later in season.

When and How to Monitor: Monitor May through July. Check along edges of crop, particularly areas adjacent to hayland, pastures and roadsides. Estimate number of hoppers/yard^2 (m^2).

Economic Threshold: 8-13 grasshoppers/m^2. Early in the season, when grasshoppers are small, 18 grasshoppers/m^2 and visible crop damage may be a more appropriate threshold.

A rough estimate for an economic threshold for grasshoppers in crops to be used as greenfeed has been suggested at 20 grasshoppers/m^2 or higher.

WHEAT MIDGE (wheat only)

When and How to Monitor: Monitor in July when crop emerges from boot stage until flowering. Check crop canopy at dusk for signs of wheat midge adult activity. At each stop, examine 10 heads. Record the number of midge adults observed on or near heads. Calculate average number of midge per head.

Sticky traps may be used to capture adult midge activity in wheat fields.

Economic Threshold: For yield only: 1 adult midge per 4 to 5 heads. At this level of infestation, wheat yields will be reduced by approximately 15% if the midge is not controlled. To maintain optimum grade: 1 adult midge per 8 to 10 wheat heads during the susceptible stage.

APHIDS

Typical Damage: Visible wilting of plants, yellow patches in fields, plants are sticky.

When and How to Monitor: Monitor July through early August. Check 20 stems in each of 5 areas. Counts should be at least 50 paces apart, and observations should be made well into the center of the field. Too frequently farmers become alarmed after checking a few plants along the margins, especially near shelterbelts, where populations are high. Record the total number of aphids and calculate the average per plant.

Economic Threshold: 12-15 aphids/stem until about 2 weeks after flowering.

CUTWORMS

Typical Damage: Plants cut off at or near soil surface, some leaf feeding above ground, plants missing from rows, bare patches appearing in field.

When and How to Monitor: Monitor late May to mid-July. At each stop, check several 1m^2 areas. Use trowel or shovel to carefully search through top half to 1 inch of soil for cutworm larvae.

Economic Threshold: 3-4/m^2

ARMYWORMS

Typical Damage: Leaves stripped from plants, awns chewed from heads, heads clipped.

When and How to Monitor: Monitor mid-June through July. At each stop shake plants in 1 m^2 area and carefully check soil surface for dislodged larvae.

Economic Threshold: 10 larvae/m^2. For migrating Armyworms: Treat a couple of swaths ahead of the infestation in the direction of movement to form a barrier strip.

BARLEY THRIPS

When and How to Monitor: Sampling should begin when the flag leaf is first visible and continue until the head is completely emerged from the boot. Sample at least 50 feet in from the field margin. Most thrips can be found under the top 2 leaf sheaths. Unroll the leaf sheaths away from the stem to find the thrips.

Economic Threshold: Insecticide treatments are only effective when applied before heading is complete.

Treat when thrips are equal to or greater than the number calculated by:

Threshold (Thrips/stem) = (Cost of Control ÷ expected $ value per bushel)/0.4

Small Grains (wheat, barley, oats) Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Grasshoppers	Eco bran bait	0.8-1.6kg	$2.80-$5.60	14 (oats, wheat) 28 (barley)	G	
	Matador (young grasshoppers only)	0.026-0.034 L	$3.64-$4.75	Do not apply within 28 days of harvest or 14 days of livestock foraging	A or G	64-110
	Decis 5F	0.32-0.048 L	$3.36-$5.04	31 (oats) 40 (wheat, barley)	A or G	15000
	Decis 5EC	0.04-0.06 L (ground) 0.06 L (air)	$3.46-$5.19 (ground), $5.19 (air)	31 (oats) 40 (wheat, barley)	A or G	395
	Ripcord (young grasshoppers only) (wheat and barley only)	0.02-0.028 L	$2.54-$3.56	30 (wheat) 60 (barley)	G	242-542
	Malathion 500E (young grasshoppers)	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800
	Malathion 500	0.68 L	$8.60	7	A or G	4302

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD$_{50}$ (Mammalian Toxicity)[1]
	Lorsban/Nufos/ Pyrinex	0.235-0.354 L	$4.16-$6.27	60	A or G	272/205/418
	Sevin XLR Plus	0.50-1.01 L	$7.00-$14.14	14 (wheat) 28 (barley)	A or G	649
	Lagon	0.22-0.40 L	$5.01-$9.10	2	A or G	60
Wheat Midge (a pest of wheat only)	Rotate Crops – Continuous wheat cropping encourages higher wheat midge populations.					
	Lorsban/Nufos/ Pyrinex	0.336-0.405 L	$5.95-$7.17	60	A or G	272/205/418
	Cygon 480/ Lagon	0.40 L	$9.10-$9.60	21	A or G	450
Aphids	Malathion 500E/ Fyfanon	0.45-1.11 L	$5.54-$13.65	7	A or G	1375-2800
	Malathion 500	0.60-0.8 L	$7.59-$10.12	7	A or G	4302
	Cygon 480	0.17 L	$4.08	21	A or G	450
	Di-Syston (Barley and oats only)	3.04 kg	$20.55	60	G	14-52
Cutworms (Army, dark sided, pale western, redbacked)	Decis 5EC	0.08 L	$6.92	31 (oats) 40 (barley, wheat)	A or G	395
	Lorsban/Nufos/ Pyrinex	0.354-0.486 L	$6.27-$8.60	60	A or G	272/205/418
	Pounce	0.075-0.158	$7.60-$15.20	Treat prior to 6-leaf stage	G	1030
	Ricord (barley and wheat only)	0.07 L	$8.89	21	G	242-542
Wireworms	N-M Dual Purpose	**rate/ 25 kg seed** 52 (wheat) 65 (barley) 92 (oats)	**Cost/25 kg seed** $1.26 (wheat) $1.17 (barley) $1.46 (oats)	Seed Treatment	Seed Treatment	N/A
	DB Green L	**rate/ 25 kg seed** 78 ml (wheat) 99 ml (barley) 138 ml (oats)	**Cost/25 kg seed** $1.50 (wheat) $1.91 (barley) $2.66 (oats)	Seed Treatment	Seed Treatment	N/A
	Vitavax Dual Powder	**grams/25 kg seed** 55-65 (wheat) 70 (barley) 95 (oats)	**Cost/25 kg seed** $3.27 (wheat) $3.51 (barley) $4.82 (oats)	Seed Treatment	Seed Treatment	N/A
	Vitavax Dual Solution	**ml/25 kg seed** 75 -90 (wheat) 75-90 (barley) 75 (oats)	**Cost/25 kg seed** $2.95-$3.52 (wheat) $2.95-$3.52 (barley) $2.95 (oats)	Seed Treatment	Seed Treatment	N/A
	Vitaflo Dual Purpose (wheat and barley only)	**ml/25 kg seed** 65 (wheat) 81 (barley)	**Cost/25 kg seed** $2.86 (wheat) $3.57 (oats)	Seed Treatment	Seed Treatment	N/A

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
True Armyworm	Dylox	0.61 L	$10.58	21	A or G	950
	Malathion 500E/ Fyfanon	0.45-1.11 L	$5.54-$13.65	7	A or G	1375-2800/ 3400
	Malathion 500	0.60-0.80 L	$7.59-$10.12	7	A or G	4302
	Lorsban/Nufos/ Pyrinex	0.354-0.486 L	$6.27-$8.60	60	A or G	272/205/418
	Lannate	0.1093-0.2185kg	$7.87-$15.73	20	A or G	30-34
	Sevin XLR Plus	1.01-2.12 L	$14.14-$29.68	14 (wheat, oats) 28 (barley)	A or G	649
	Methoxychlor	2.83-4.55 L	$79.81-$128.31	7	G	5000-7000
Thrips	Lannate	0.1214kg	$8.74	20	A or G	30-34
	Cygon	0.40 L	$9.60	21	A or G	450
	Lagon	0.40 L	$9.10	7	A or G	60
Hessian Fly	Never plant wheat in the same field 2 years in a row in areas where Hessian flies are a problem; winter wheat planted in September will likely be free of Hessian flies.					
	Di-Syston 15-G (for winter wheat only)	3.04 kg	$22.19	Apply at seeding time in the fall	G	14-52
Wheat stem sawfly	Solid-stem wheat varieties (such as AC Eatonia and AC Abbey) can reduce damage by wheat stem sawfly larvae compared to susceptible varieties, however the level of control can vary depending on environmental conditions.					

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE MAKING INSECTICIDE DECISIONS

[1] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Soybean Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Seedcorn Maggot	Agrox D-L Plus, DLC, Agrox B-3	See "Disease Control – Seed Treatments" section of this guide				N/A
Wireworms	Agrox D-L Plus, DLC, Agrox B-3	See "Disease Control – Seed Treatments" section of this guide				N/A
Spider mites	Lagon	0.40 L	$9.10	7	A or G	60

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE APPLYING ANY INSECTICIDE.

[1] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Stored Grain Insect Control –

See Insect Control in Stored Grain at the end of the Insect Control section of this guide.

Summerfallow –

See grasshopper management on Pastures, etc.

Scouting for insects in Sunflower

CUTWORMS

Typical Damage: Plants cut off at or near soil surface, some leaf feeding above ground, plants missing from rows, bare patches appearing in field.

When and How to Monitor: At each stop, examine 100 plants in a row.

Economic Threshold: One per foot^2 or when stand reduction exceeds 25-30 percent.

SUNFLOWER BEETLES

Typical Damage: Adults: Leaves of seedling plants chewed or completely destroyed late May through June, shot-holes or large areas of leaves chewed July through August. Larvae: Leaves of plants chewed or completely destroyed.

When and How to Monitor: Adults: Monitor May through June on seedling plants. Examine 10 plants at random at each stop. Larvae: Monitor July through mid-August. Examine 10 plants at random at each sampling site. Peel back leaves around growing tip and record total number of larvae found. Calculate average number per plant.

Economic Threshold: Adults: 1-2/seedling; Larvae: 10 to 15/plant or 25-30% defoliation.

Insects affecting the seeds

BANDED SUNFLOWER MOTH

When and How to Monitor: Scouting should be conducted prior to the R5.1 plant growth stage. Count moths on 20 plants from 5 different sites for a total of 100 plants. Sample in early evening or early morning when the moths are most active to get the most accurate counts.

Economic Threshold: 1 moth per 2 plants when scouting at dusk or later. If treatment is warranted, it should be applied at the R5.1 sunflower plant growth stage.

RED SUNFLOWER SEED WEEVIL

Typical Damage: Seeds partly or completely destroyed, exit hole in hull. Shriveled kernels, kernels completely destroyed.

When and How to Monitor: Monitor fields when ray petal being to form and continue every 2 to 3 days until pollination is complete. When scouting, use the X pattern and begin counts at least 70 to 100 feet into the field to avoid margin effects. Examine 5 plants at each site for a total of 25 plants. For checking individual sunflower heads, brush the face of the head vigorously to bring the weevils to the surface, or use a commercial preparation of mosquito repellent containing diethyl toluamide (DEET) to spray the heads. This will cause the weevils to move out of hiding spots. Record total number of weevils and calculate average per head.

Economic Threshold:

Confection Sunflowers: 1-2 weevils/plant. Control is based on a need to keep seed damage below 3 or 4% because of industry standards.

Oilseed sunflowers: 12-14 weevils/head.

The ideal plant stage to treat is when most plants in the field are at 10% pollen shed (R5.4).

Sunflowers Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Cutworms (Army, pale western, redbacked)	Lorsban/Nufos	0.354 -0.486 L	$6.27-$8.60	42	G	272/205
	Pyrinex	0.354 -0.486 L	$6.27-$8.60	90	G	418
	Pounce	0.075-0.158 L	$7.60-$15.20	Treat prior to 6-leaf stage	G	1030
Sunflower Beetle	Matador	0.017-0.026 L	$2.38-$3.64	70	A or G	64-110
	Decis 5EC	0.04 L	$3.46	70	A or G	395
	Cymbush	0.04 L	$2.85	70	A or G	680
	Ripcord	0.028 L	$3.56	70	A or G	242-542
	Thionex	0.6 L	$8.70	60	G	110
	Thiodan	0.6 L	$9.24	60	G	107.2
	Furadan	0.11 L	$3.85	60	G	7.34
Sunflower Moth	Dipel (young larvae)	0.1275-0.2529 kg	$11.27-$22.35	N/A	A or G	> 4,000
Banded sunflower moth	Deep fall plowing of sunflower stalks and late planting will provide some control					
Sunflower Seed Weevil	Early planting helps to reduce seed damage by sunflower seed weevils					
	Cymbush	0.04 L	$2.85	70	A or G	680
	Ripcord	0.028 L	$3.56	70	A or G	242-542
	Lorsban/Nufos	0.486 L	$8.60	42	A or G	272/205

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE MAKING INSECTICIDE DECISIONS

[1] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Field Scouting in Sweet Clover

SWEETCLOVER WEEVIL

Typical Damage: Adults chew crescent-shaped and jagged notches in leaves and can completely defoliate plants.

When and How to Monitor: Inspect clover seedlings for weevil damage in spring as the seedlings emerge. In mid-summer and throughout August, inspect first-year clover stands for damage along crop margins. Invading weevils move into these stands only as far as necessary to satisfy their food requirements, so an insecticide application to affected field margins is usually all that is required. Visually estimating the number of weevils per plant must be done carefully because weevils fall from plants easily and are difficult to see on the ground.

Economic Threshold: 1st year stands: 1 weevil adult/3 seedlings (1/5 seedlings under dry conditions). 2nd year stands: 9-12 weevil adults/plant

Sweet Clover Insect Management Chart

Insect	Product	Rate/ Acre	Cost/Acre	Preharvest interval day(s)	Application (A=aerial; G=ground)	LD_{50} (Mammalian Toxicity)[1]
Sweetclover Weevil	Malathion 500	0.56-1.01 L	$7.08-$12.78	7-Cattle may be returned immediately after spraying	A or G	1375-2800
	Malathion 500E / Fyfanon	0.61-1.01 L	$7.50-$12.42			
	Guthion SC Guthion 50/ Sniper	0.91 L 0.45 L	$14.56 $13.10	21	A or G	21-27 12.3-24.7
	Cygon/Lagon	0.34-0.44 L	$8.16-$10.56	28	A or G	450/60
	Methoxychlor	2.02-2.53 L	$56.96-$71.35	7	G	5000-7000
Alfalfa Weevil	Sniper	0.45-0.71 kg	$13.10-$20.37	21	A or G	12.3-24.7
	Methoxychlor	2.02-2.53 L	$56.96-$71.35	7	G	5000-7000
Grasshoppers	Eco bran bait	0.8-1.6kg	$2.80-$5.60	2	G	N/A
	Malathion 500E/ Fyfanon	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800/3400
	Guthion SC Guthion 50 Solupak (Border Application Only)	0.44- 0.70 L 0.21-0.34 L	$7.04-$11.20 $6.11 -$9.89	21 21	A or G	21-37 12.3-24.7/7
	Sevin XLR Plus	0.50-1.01 L	$7.00-$14.14	2	A or G	649
	Methoxychlor	2.02-2.53 L	$56.96-$71.35	7	G	5000-7000
Leafhoppers	Malathion 500E/ Fyfanon	0.91-1.11 L	$11.19-$13.65	7	A or G	1375-2800/ 3400
	Guthion SC Guthion 50/ Sniper	0.91-1.41 L 0.45-0.70 L	$14.56-$22.56 $13.10-$20.37	21	A or G	21-37 12.3-24.7/7
	Sevin XLR Plus	1.01-1.6 L	$14.14-$22.40	2	A or G	649
	Dibrom	0.44-0.88 L	$16.01-$32.01	4	A or G	345
	Methoxychlor	2.02-2.53 L	$56.96 -$71.35	7	G	5000-7000
Lygus Bugs	Dibrom	0.44-0.88 L	$16.01-$32.01	4	A or G	345
	Guthion SC Guthion 50/ Sniper	0.91-1.41 L 0.45-0.70 L	$14.56-$22.56 $13.10-$20.37	21	A or G	21-37
Aphids	Dibrom	0.44-0.88 L	$16.01-$32.01	4	A or G	345
True Armyworm	Methoxychlor	2.83-4.55 L	$79.81-$128.31	7	G	5000-7000
Beet Webworm	Sevin XLR Plus	1.01-2.12 L	$14.14-$29.68	2	A or G	649
Blister Beetle	Sevin XLR Plus	1.01-1.6 L	$14.14-$22.40	2	A or G	649

ALWAYS CONSULT THE INSECTICIDE LABEL BEFORE MAKING INSECTICIDE DECISIONS

[1] LD_{50} values represent the relative toxicity of a pesticide. They represent the dose (in mg/kg body weight) that will kill 50% of the test animals. Thus the lower the number the greater the toxicity. Values given are for oral LD_{50}.

Insecticide Poisoning in Humans

Organophosphate (OP) and carbamate insecticides (identified on the Families of Insecticides chart page 319) can pose a more serious risk to unprotected persons. Poisonings can occur while mixing, loading and/or during the application of these products without the appropriate protective equipment or measures. These pesticides are readily absorbed through the skin or the lungs, and can act as nervous system toxins. Overexposure can produce symptoms such as headache, nausea, pupil dilation and excessive sweating and salivation. Higher doses may cause breathing difficulties, muscle twitching, weakness and spasms. Very high doses have caused respiratory failure and death.

Both OP and carbamate pesticides inhibit an enzyme called cholinesterase. Measurements of cholinesterase in the blood before and during the application season can indicate harmful exposures to OPs and carbamates. **Persons who intend to mix, load and/or apply these types of pesticides repeatedly during a season, need a baseline and repeat measurements. Consult your doctor before the spraying season to arrange for these measurements.** For more information, see ***Monitoring Exposure to Organophosphorous and/or Carbamate Insecticides,*** a joint publication of Saskatchewan Labour and Saskatchewan Health. This publication can be viewed on the SK Labour web site: www.labour.gov.sk.ca.

Degree of Risk and Hazard Rating:

(see page 10 for full description)

Danger poison: LD_{50} is less than 500 mg/kg and indicates high toxicity.

Warning poison: LD_{50} is between 500-1,000 mg/kg and indicates moderate toxicity.

Caution poison: LD_{50} is between 1,000-2,500 mg/kg and indicates low toxicity.

(LD_{50} values are used to rate the toxicity of pesticides. They refer to the dose of pesticide (in mg per kg) that is lethal to 50 percent of a test animal population).

Resistance of Insects to Insecticides

Repeated use of the same or similar insecticides against a particular insect in a given area may result in the effectiveness of the insecticide being reduced. To retard or prevent resistance of insects to insecticides: use insecticides only when the economic threshold for a pest has been surpassed and natural controls fail to limit economic damage, and rotate between insecticides with different chemical structures, particularly if several applications are made in a season.

Insecticides can be classified according to their similarity in chemical structure (insecticide family in the table below), and by mode of action (the process by which the insecticide kills the insect). By selecting products from different chemical families (i.e. with different insecticide structures) for an insecticide rotation program, insecticide resistance can be prevented.

Families of Insecticides

INSECTICIDE FAMILY	TRADE NAME	ACTIVE INGREDIENT	MODE OF ENTRY
CARBAMATES	Sevin, Eco bran bait	carbaryl	contact/stomach
	Furadan	carbofuran	contact/systemic
	Lannate	methomyl	contact/stomach
	Pirimor	pirimicarb	contact vapour/systemic
ORGANOPHOSPHATES	Guthion, Sniper	azinphos-methyl	contact
	Cygon, Lagon	dimethoate	contact/systemic
	Malathion, Fyfanon	malathion	contact
	Lorsban, Pyrinex, Nufos	chlorpyrifos	contact/stomach/inhalation
	Monitor	methamidophos	contact/systemic
	Di-Syston	disulfoton	systemic
	Counter	terbufos	systemic
	Thimet	phorate	systemic
	Orthene	acephate	contact/stomach/systemic
	Diazinon	diazinon	contact/stomach
	Dylox	trichlorfon	contact/stomach
	Dibrom	naled	contact/stomach poison
	Imidan	phosmet	
	Parathion	parathion	contact/stomach/respiratory
ORGANOCHLORINES	Endosulfan, Thiodan Thionex	endosulfan	contact/stomach
	Lindane	gamma BHC	contact/stomach
	Methoxychlor	methoxychlor	contact/stomach
PYRETHROIDS	Cymbush, Ripcord	cypermethrin	contact/stomach
	Decis	deltamethrin	contact/stomach
	Pounce	permethrin	contact/stomach
	Matador	cyhalothrin-lambda	contact/stomach
BIOLOGICALS	Dipel	*B.t.* ssp. kurstaki	stomach
NEONICOTINOIDS	Admire, Gaucho	imidacloprid	contact/stomach
	Helix	thiamethoxam	

Insecticide Directory

For rates, costs, and preharvest intervals for insecticides, see the insect management charts on pp. 286-316.

Admire

Company:

Bayer CropScience

Formulation:

240 g/L imidacloprid formulated as a flowable

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Colorado potato beetle, aphids, leafhoppers, potato flea beetles (suppression only)

Application:

Do not apply by aerial application.

Soil application: For best results, direct spray on the seed pieces or seed potatoes in the furrow. The higher rate is recommended when extended length of control is needed. Do not follow a soil application with a foliar application.

Foliar application: A maximum of two foliar applications of Admire may be made per season.

How it Works:

Admire is a systemic, chloronicotinyl insecticide.

Restrictions:

Do not apply within 15m of well-heads or aquatic systems, including marshes, ponds, ditches, streams, lakes, etc. Do not apply through any type of irrigation system.

Precautions:

Do not re-enter treated areas for 24 hours after foliar application of Admire. Admire is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Highly toxic to aquatic invertebrates and birds.

Hazard Rating:

☠ Caution Poison

Counter 5G/Counter 15G

Counter 5G will no longer be available for use after the end of June 2004.
Counter 15G will no longer be available for use after December 31, 2004.

Company:

BASF Canada

Formulations:

5 percent and 15 percent terbufos formulated as a granular.

Container sizes-20 kg (5 percent); 20 kg (15 percent).

Insects Controlled and Registered Crops:

CROP	INSECT
Canola, mustard (Counter 5G)	Flea beetles, cabbage root maggot suppression
Field corn, sweet corn (Counter 15G)	Wireworm, seed corn maggot

Application:

For control of flea beetles or suppression of root maggots in canola and mustard at planting time, blend seed and granules in a mechanical mixer or stir with a stick in the drill box. Mix 2.2-4.5 kg Counter 5G with enough seed to sow 1 acre. Adjust the flow rate to sow the combined weight of seed and Counter 5G.

Example: If 2.2 kg of seed per acre is to be sown, mix with 2.2 kg of Counter 5G, adjusting seeding rate to sow 4.4 kg per acre.

To reduce root maggot feeding damage in canola, mix 2.2 to 4.5 kg Counter 5G with enough seed to sow 1 acre. Adjust the flow rate to sow the combined weight of seed and Counter 5G.

For control of seed corn maggot and wireworms in corn, place granules in a 7 inch (18 cm) band over the row directly behind planter shoe or place directly into the seed furrow behind the planter shoe. Works as a systemic poison with good initial and residual activity.

Use higher rates of Counter 5G when extreme infestations of flea beetles or root maggots are anticipated.

Counter 5G can be effectively used with air seeders provided that the seed is placed in rows. If the seed emerges in rows then Counter 5G will continue to be effective. When the seed is widely distributed with a broadcast boot under a wide sweep, Counter 5G will not provide adequate control.

Counter 5G may be mixed with fungicide treated seed.

How it Works:

Counter is a systemic, organophosphorous insecticide with effective initial and residual activity.

Restrictions:

Storage: Store away from food and feed. Store open bags in labelled sealed drums or heavy plastic bags.

Others: Treated seed must not be used for feed or oil processing. Excess treated seed should be used up by double planting.

Do not reuse the bag. Completely empty the bag, make the empty bag unsuitable for further use, dispose of bag in accordance with provincial requirements.

Precautions:

Counter has a high acute mammalian toxicity. Very highly toxic to birds, fish and other wildlife. Rapidly absorbed through skin. Repeated inhalation or skin contact may, without symptoms, progressively increase susceptibility to poisoning. Do not get in eyes, on skin or clothing. Do not handle with bare hands. Do not breathe in dust. Do not contaminate food or feed products. Wear freshly laundered, long-sleeved work clothing daily. Wear rubber gloves with sleeve cuffs covering the gloves.

Hazard Rating:

☠ Danger Poison

Cygon/Lagon

Company:

Cygon-IPCO, Cheminova

Lagon-United Agri Products

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

Cygon/Lagon-480 g/L dimethoate formulated as an emulsifiable concentrate. Container size-10 L.

Insects Controlled and Registered Crops:

CROP	INSECT
Beans	Aphids, grasshoppers, leafhoppers, lygus bugs
Potatoes	Aphids, leafhoppers
Alfalfa	Alfalfa blotch leafminer, aphids, grasshoppers, leafhoppers, lygus bug, plant bug, sweet clover weevil
Canary seed	Aphids
Canola	Aphids, grasshoppers, leafhoppers
Pastures, wasteland, forages	Grasshoppers
Wheat	Wheat midge, thrips, grasshoppers, Russian wheat aphid
Flax	Aphids
Sweet clover	Sweet clover weevil
Peas	Aphids
Barley, oats	Aphids, grasshoppers, thrips
Rye	Grasshoppers

Application:

May be applied by air or ground equipment. Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for adult insects, heavy infestations or dense canopy.

How it Works:

Broad spectrum, systemic and contact, organophosphate insecticide and acaricide.

Restrictions:

Grazing: Remove cattle prior to spraying. Read label carefully to determine livestock reentry period.

Storage: Store at temperatures between 4°C and 30°C and in areas away from feed and food.

Others: Do not treat when bees are foraging. Do not apply to alfalfa in bloom. Read label carefully to determine maximum number of applications per season. Wait at least 10 days before placing leafcutter bees in treated fields.

Precautions:

Dimethoate is of high acute mammalian toxicity and is highly toxic to birds, bees and other animals. Wear a respirator, goggles, rubber gloves, rubber boots and coveralls when handling concentrate. Avoid contact with skin and eyes. Do not inhale spray mist.

Hazard Rating:

◈ Warning Poison-Lagon

⬣ Danger Poison-Cygon

Cymbush

Company:

Syngenta

Formulations:

250 g/L cypermethrin formulated as an emulsifiable concentrate.

Container size-1L jugs.

Insects Controlled and Registered Crops:

CROP	INSECT
Canola, mustard	Flea beetle, bertha armyworm
Corn	European corn borer
Potatoes	Colorado potato beetle, potato flea beetle, potato leaf hopper, tarnished plant bug
Sunflowers	Sunflower beetle, sunflower seed weevil

Application:

May be applied by air or ground equipment, except mustard (ground application only). Apply when insects exceed economic thresholds and use sufficient water for good coverage. Refer to product label for maximum number of ground and aerial applications allowed.

How it Works:

Works as a contact and stomach poison with good residual activity. No systemic or fumigant activity.

Effects of Weather:

Avoid application when temperatures exceed 27°C.

Restrictions:

Grazing: Cover crop or crop treated with Cymbush must not be used as a green feed for animals except as noted for corn, rutabagas, and turnips.

Storage: Store in a cool, dry, well-ventilated area away from foodstuffs. This product is not affected by freezing.

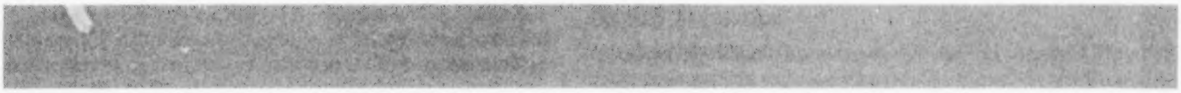
Others: Observe a 16 yard (15 m) buffer zone from water bodies by ground application and a 110 yard (100 m) buffer zone from water bodies when applied by air.

Precautions:

Cymbush is of low to moderate mammalian toxicity and is very toxic to bees and fish. Harmful or fatal if swallowed or absorbed through the skin. Causes eye and skin irritation and skin sensitization. Wear long-sleeved clothing and rubber gloves when handling or spraying. Wear face shield or eye goggles when mixing. Do not contaminate ponds, lakes or streams during sprayer filling or while spraying. Avoid spraying when bees are foraging.

Hazard Rating:

◈ Warning Poison



Decis

Company:

Bayer CropScience

Formulations:

50 g/L deltamethrin formulated as an emulsifiable concentrate and as a flowable.

Container sizes: Decis 5EC-2.5 L and 2 L jugs;

Decis 5F- 3 L jugs.

Application:

Decis may be applied by air or ground equipment to all crops with the exception of alfalfa and corn, which require ground application only. Apply when insects exceed economic threshold numbers with sufficient water for good coverage.

Use higher rates for severe infestations, on dense foliage or when a number of insect growth stages are present. Works as contact and stomach poison usually with very quick results.

Tank Mixes:

May be tank mixed with the following herbicides:

Hoe-Grass 284 (5 EC only)	Hoe-Grass II (5 EC only)
Pardner	Buctril M
Banvel	MCPA
2,4-D	Stampede EDF
Achieve (Decis 5F only)	

How it Works:

A non-systemic, synthetic pyrethroid which works by contact and ingestion.

Effects of Weather:

Do not spray under a strong temperature inversion, or when temperature exceeds 25°C. Do not apply within 1 hour of rain.

Restrictions:

Grazing: Do not feed treated alfalfa to beef cattle within 90 days of harvest. Do not allow beef cattle to graze treated cereals, flax, lentils, pasture or rangeland within 1 day of application. Dairy cattle must not be fed or grazed on Decis treated crops.

Storage: Do not store below freezing. Do not store near feed, food, seeds or fertilizer. Keep away from heat, sparks and open flames. If stored for 1 year or longer, shake well before using.

Others: Observe a 16 yard (15 m) buffer zone from environmentally sensitive areas (for example, wetlands, sloughs, rivers, houses, farm buildings) when applying by ground equipment and a 110 yard (100 m) buffer zone when applied by air. The number of aerial applications permitted varies with crop. Consult container label. In soils with high organic content (muck soils), Decis 5 EC should be applied only once per season, prior to August 1, and at rates of no more than 80 mL/acre.

Insects Controlled and Registered Crops:

DECIS 5EC

CROPS	INSECT
Alfalfa (seed crops only)	Lygus bug, alfalfa weevil
Field corn	European corn borer
Potatoes	Colorado potato beetle, potato flea beetle, tarnished plant bug, leafhopper
Canola, mustard	Flea beetle, clover cutworm, bertha armyworm, diamondback moth, beet webworm
Sunflowers	Sunflower beetle
Wheat, barley, oats, lentils, flax	Cutworms, grasshoppers
Rangeland, pastures, roadside, fence row	Grasshoppers
Flax	Cutworms, beet webworm

DECIS 5F

CROPS	INSECT
Canola	Flea beetle
Wheat, barley, oats, flax, lentils	Grasshoppers
Rangeland, pastures, roadsides	Grasshoppers

Precautions:

Decis is of high mammalian toxicity and is a severe eye and skin irritant. Avoid contacting or breathing spray mist. Very toxic to aquatic organisms and fish. Toxic to bees. Avoid spraying when bees are foraging.

Wear protective clothing, including goggles and respirator, when handling or spraying. Do not contaminate or store near feed or foodstuffs. Wash thoroughly after using Decis.

Hazard Rating:

☠ Danger Poison

Diazinon

Company:

United Agri Products (500E, 50W)
IPCO (500 EC)

Formulations:

Diazinon 500E – 50% diazinon formulated as a liquid. Container size: 4 L, 10L

Diazinon 500 EC – 500 g/L diazinon formulated as an emulsifiable concentrate. Container size: 4 L, 10 L

Diazinon 50W – 50 % diazinon formulated as a wettable powder. Container size: 2 kg

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Aphids, flea beetles, Colorado potato beetles, leafhoppers
Corn, peas, beans	Seedcorn maggot
Beans (field)	Aphids
Rangeland, pasture, ditch banks, roadsides, fence rows, wasteland.	Grasshoppers

Application:

Apply Diazinon 50W by ground only.

How it Works:

Diazinon is an organophosphate insecticide with systemic and contact activity.

Effects of Weather:

Diazinon 500 EC/500E and 50W work most effectively if the temperature is 20°C or more or when temperatures will reach or exceed this minimum.

Restrictions:

Beneficial insects: Avoid spraying open flowers. Highly toxic to bees exposed to direct treatment or to residues on crops.

Environment: Do not contaminate any body of water, waterway or water source. Toxic to birds, fish, and wildlife, including waterfowl.

Precautions:

May be fatal if swallowed. Avoid contact with skin and inhalation of spray mist. Wear an approved respirator. Wash thoroughly after handling and before eating, drinking and smoking.

Hazard Rating:

☠ Danger Poison

Dibrom

Company:

United Agri Products

Formulations:

864 g/L naled formulated as an emulsifiable concentrate.

Container size – 4 x 3.78 L jugs per case.

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa, Clover, Vetch	Aphids, loopers, leafhoppers, Lygus bugs
Potatoes	Flea beetles, Colorado potato beetles, leafhoppers
Rangeland, field areas and pastures.	Grasshoppers

Application:

Apply Dibrom by ground or air. Use designated amounts in full volumes of water. For ground application use 100 – 300 L of water per hectare. For aerial use 11 – 22 L of water per hectare unless otherwise stated.

How it Works:

Dibrom is an organophosphate insecticide. It acts as a contact and stomach poison.

Effects of Weather:

Do not apply Dibrom when air temperature is greater than 32°C.

Restrictions:

Environment: Do not contaminate any body of water, waterway or water source. Dibrom is highly to moderately toxic to birds, aquatic animals and other wildlife.

Precautions:

Concentrate may cause skin damage. Do not get on skin, eyes or clothing. Use waterproof gloves and face shield or goggles when handling concentrate. Harmful if swallowed. Avoid breathing spray mist.

Avoid contamination of feed, foodstuffs and drinking water.

Highly toxic to bees, avoid application during periods of bee activity.

Hazard Rating:

☠ Danger Poison

Dipel 2X DF

Company:

Valent BioSciences

Formulation:

32 BIU/kg of *Bacillus thuringiensis* subsp. *Kurstaki*

Insects Controlled and Registered Crops:

CROP	INSECT
Sunflower	Sunflower moth
Timothy	Essex (European) skipper
Corn (Sweet and Field)	European corn borer larvae

Application:

Treat when larvae are young (early instars) before the crop is damaged. A spreader sticker such as Triton B1956 should be used to give thorough foliage coverage.

How it Works:

A biological stomach insecticide resulting in the larvae ceasing to eat in a few hours, with death usually occurring within 1-3 days.

Restrictions:

Storage: Store at temperatures between 0° and 25°C (cooler temperatures preferable).

Others: Do not allow dilute spray to stand in tank for more than 12 hours. Use product within 24 months of date of manufacture if stored at cool temperatures. Final spray solution for Bt should have a pH of 5-7.

Precautions:

Harmful if swallowed, inhaled, or absorbed through the skin. Avoid breathing dust or spray mist. Avoid contact with skin, eyes, or clothing. In case of contact with eyes or skin, immediately flush eyes or skin with plenty of water.

Hazard Rating:

☠ Caution Poison

Di-Syston

Company:

Bayer CropScience

Formulations:

15 percent disulfoton formulated as a granular. Container size-20 kg bag.

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Aphids, Colorado potato beetle, leafhoppers, potato flea beetle
Wheat (fall)	Hessian fly
Beans, peas	Aphids, leafhoppers
Barley, oats	Aphids, mites

Application:

Place granules in the seed furrow or in a band on each side of the seed furrow at planting. Application may also be made as a side dressing, either above or with fertilizer after plants become established. Use higher rates in organic soils.

On row crops when row spacing is extremely narrow, do not place Di-Syston treated areas (band or furrow) closer together than 15 centimetres.

How it Works:

Di-Syston is a systemic insecticide that enters the plant through the root system. When placed near the root, Di-Syston is picked up and moves in the sap stream to all parts of the plant where it kills insects as they feed on the plant.

Restrictions:

Storage: Store away from food or feed.

Precautions:

Di-Syston is of high acute mammalian toxicity and poisonous if swallowed, inhaled or absorbed through skin. Rapidly absorbed through skin. Wear protective clothing, rubber gloves and goggles. Wear an approved respirator. Do not get in eyes or on skin. Do not breathe fumes or spray mist. Keep all unprotected persons out of the treatment area.

Hazard Rating:

☠ Danger Poison

Dylox

Company:

Bayer CropScience

Formulations:

420 g/L trichlorfon formulated as a liquid.

Container size-10 L container.

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa	Alfalfa caterpillar, alfalfa webworm, beet army worm, variegated cut worm, lygus bugs, stink bugs, tarnished plant bugs.
Barley, flax, oats, wheat	Armyworm (true), western yellow-striped armyworm, beet webworm, variegated cutworm, bertha armyworm
Beans (dry, Lima, and snap)	Armyworms, imported cabbageworm, dipterous leaf miners, lygus bugs, Mexican bean beetles, stink bug, variegated cutworm
Corn (field, sweet)	Armyworms, cutworms
Canola	Beet webworm, diamond back moth, lygus bug

Application:

May be applied by air or ground equipment. Works as a contact or stomach poison. Apply when insects exceed economic threshold levels and use sufficient water for good coverage.

How it Works:

Dylox is an organophosphate insecticide that works as a contact or stomach poison.

Effects of Weather:

Do not apply to alfalfa 48 hours before or after a period when the temperature drops below 5°C or a frost occurs. Under these conditions leaf burn resulting in yield loss may occur.

Restrictions:

Storage: Do not store below 0°C. Keep in cool, dry place. Keep away from heat and open flame.

Others: Do not apply to flax after flowering. Do not contaminate streams, lakes or ponds. May cause spotting of car paint. Wash car immediately if accidental exposure occurs.

Precautions:

Dylox is of high acute mammalian toxicity and can cause eye irritation. Dylox is toxic to bees. May be harmful if swallowed, inhaled or absorbed through the skin. Avoid contact with eyes or skin. Do not breathe vapours. Wash thoroughly with soap and water after handling.

Hazard Rating:

☠ Danger Poison

Eco bran bait

Company:

Peacock Industries

Formulation:

Wheat bran infused with carbaryl insecticide

Container size – 20 kg bag

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa, clover, corn (field and sweet), beans, oats, rye, wheat, barley, canola, pastures, rangelands, forage grasses, field borders, headlands, rights-of-way, roadsides, wastelands	Grasshoppers

Preharvest Intervals and Livestock Re-entry Periods:

Crop	Preharvest Interval/ Livestock re-entry period
Corn (field and sweet)	1
Alfalfa, clover	2
Beans	5
Oats, rye, wheat	14
Barley	28
Canola	Treat only seedlings
Field borders, headlands, rights-of-way, roadsides, wastelands	0
Entry of beef cattle or other livestock to pastures, rangelands or forage grasses	1
Entry of dairy cattle to pastures or rangelands, harvest of forage crops	2

Application:

For ground application only. Do not apply by air.

Broadcast application may be made with spreaders, hand applicators, or by hand. Use gloves and wash thoroughly following application. More information on application and applicators can be found at: http://www.grasshoppercontrol.com/

Restrictions:

Do not apply within 50m of sloughs, ponds, streams, dugouts or open water. Apply when winds are between 3-8 kph and do not favour drift.

Presence of product on flowering crops such as alfalfa and clover will not harm foraging honey or leafcutter bees.

May be used in pastures while beef cattle are grazing.

Precautions:

Harmful if inhaled or swallowed. Avoid breathing dust or vapour from bait. Use only in well-ventilated areas. May cause eye irritation. Avoid contact with eyes and skin. Wash thoroughly after handling and before eating or smoking. Avoid contamination of feed and foodstuffs. Keep away from heat, sparks and open flame.

Endosulfan/Thiodan/Thionex

Company:

Endosulfan-United Agri Products

Thiodan-Bayer CropScience

Thionex-Makhteshim-Agan of North America Inc. (distributed by United Agri Products)

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulation:

Thiodan/Thionex-400 g/L endosulfan formulated as an emulsifiable concentrate. Container size-10 L

Endosulfan-50% endosulfan formulated as a wettable powder. Container size-1 kg.

Insects Controlled and Registered Crops:

CROP	INSECT
Potato	Aphid, Colorado potato beetle, flea beetle, leafhopper
Sunflower	Sunflower beetle
Beans	Aphids, potato leafhoppers

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage.

How it Works:

Organochlorine insecticides that work as contact and stomach poisons.

Tank Mixes:

Compatible with most commonly used insecticides and fungicides, except Bordeaux mixture and hydrated lime.

Restrictions:

Grazing: Do not feed treated crop residue to livestock.

Storage: Do not store below freezing. If stored one year or longer, shake well before using.

Others: On sunflowers, do not make more than 1 application per season.

Precautions:

Thiodan/Endosulfan/Thionex is of high, acute mammalian toxicity and is toxic to bees. Highly toxic to fish. Hazardous if swallowed, inhaled or absorbed through the skin. Wear synthetic rubber gloves and approved respirator in prolonged spray-mixing and loading operations. Do not apply or allow to drift to areas occupied by unprotected persons and animals or onto streams, lakes or ponds.

Hazard Rating:

☠ Danger Poison

Furadan

Company:

Bayer CropScience

Formulations:

480 g/L carbofuran formulated as a flowable.

Container sizes: Furadan 480F-4 L jug

How it Works:

Furadan is a broad spectrum, carbamate insecticide, acaricide and nematicide.

Effects of Weather:

Avoid spraying when winds are more than 15 km/hr or less than 5 km/hr. When conditions are hot and dry, set up equipment to produce larger droplets to reduce evaporation effects.

Tank Mixes:

Furadan 480F is compatible with fungicides commonly used on the same crops. Do not mix with Bordeaux and hydrated lime.

Restrictions:

Storage: Do not store below 2°C. Store separately from food and feed.

Aerial restrictions: Do not apply by air on potatoes or sunflowers. Do not spray fields of corn smaller than 12.5 acres (5 ha) by air.

Do not apply Furadan to areas where bees are actively foraging or near apiaries. Do not spray sunflowers after plants are more than 24 inches (60 cm) in height or after heads have started to form. The use of Furadan 480F may be hazardous to burrowing owls. Do not apply within 270 yards (250 m) of known burrowing owl nests. Do not make more than 2 applications per season to potatoes, corn, and sunflower.

Insects Controlled and Registered Crops:

FURADAN 480F

CROP	INSECT
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug
Corn (sweet, field, silage)	European corn borer
Sunflower	Sunflower beetle
Canola, mustard	Flea beetle, red turnip beetle

Application: Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage.

Precautions:

Of high acute mammalian toxicity. Highly toxic to bees, waterfowl, birds, fish and other wildlife. Poisonous by swallowing or inhalation. Do not breathe spray mist. Do not get in eyes. Wear goggles at all times. Use an approved respirator. Do not re-enter fields less than 48 hours following application, unless appropriate protective clothing is worn. (i.e. long-sleeved shirt and long pants).

Hazard Rating:

☠ Danger Poison

Guthion/Sniper

Company:

Guthion-Bayer CropScience

Sniper-United Agri Products

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

240 g/L azinphos-methyl formulated as a spray concentrate and 50 percent azinphos-methyl formulated as a wettable powder.

Container sizes-
Guthion SC-2 x 10 L
Guthion Solupak-4 x 2 kg

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa, clover	Sweet clover weevil, grasshopper*, lygus bug, alfalfa plant bug, leafhoppers, alfalfa weevil, spittlebugs
Rye	Grasshopper
Potatoes	Colorado potato beetle, tarnished plant bug*, flea beetles*, leaf hoppers*

*Guthion only

Application:

May be applied by air or ground equipment. Apply when insects exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for severe infestations, dense canopy or for adult insects (grasshoppers). Refer to label for specific mixing instructions.

How it Works:

Guthion is a contact, non-systemic, organophosphate insecticide and acaricide.

Restrictions:

Storage: Store at temperatures above freezing. Keep away from heat and open flame. Keep separate from food or feed.

For grasshopper control in rye do not apply more than once per season. Do not apply to alfalfa or clover more than once per cutting at rates higher than 0.91 L/acre. Do not apply to crops in bloom or allow spray to drift toward beehives.

Precautions:

Reentry Period: Do not re-enter treated fields without protective equipment within 2 days of application.

Guthion is of high acute mammalian toxicity and is poisonous if swallowed, inhaled or absorbed through the skin. Do not get in eyes or on skin. Do not breathe fumes or spray mist. Wear an approved agricultural respirator, protective clothing, natural rubber gloves and goggles when mixing or applying. Wash hands, arms and face thoroughly with soap and warm water after use. Wash all contaminated clothing with soap and hot water before re-use.

Highly toxic to bees. Do not spray crops in bloom. To protect fish and wildlife do not contaminate streams, lakes or ponds.

Hazard Rating:

☠ Danger Poison

Imidan

Company:

United Agri Products

Formulation:

50% phosmet formulated as a wettable powder in water soluble sachets.

Insects Controlled and Registered Crops:

CROP	INSECT
Alfalfa	Alfalfa weevil, Alfalfa blotch leafminer
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, potato aphid

Application:

Apply by ground only.

Imidan 50-WP instapak is packaged in water soluble sachets that are to be dropped into the spray tank unopened. Do not use in low-volume, gear-type spray equipment.

How it Works:

Imidan is an organophosphate insecticide.

Restrictions:

Storage: Keep sachets dry and do not allow sachets to contact any moist surface prior to adding to spray tank. Keep water soluble sachets in the protective container and store in a cool, dry place. Do not store at temperatures above 40°C.

Precautions:

Harmful if swallowed, inhaled or absorbed through the skin. Wear protective clothing, including rubber gloves and goggles, during mixing, loading and spraying.

Imidan is toxic to fish and bees. Keep out of any body of water.

Hazard Rating:

☠ Danger Poison

Lannate

Company:

DuPont Canada Inc.

Formulations:

90% methomyl formulated as a water soluble powder. Container size-(24 x 225 gram water soluble bags).

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Alfalfa looper, bertha armyworm, clover cutworm, beet webworm
Flax	Bertha armyworm
Peas	Alfalfa looper, pea aphid
Wheat, oats, barley	True armyworm, thrips
Potatoes	Aphids, leafhoppers, flea beetles, variegated cutworm

Application:

May be applied to canola, flax and cereals by air or ground equipment. Ground applications only to peas and potatoes. Apply when insects exceed threshold levels using sufficient water for good coverage.

Use higher rates for mature insects, dense canopy or when infestations are heavy. Early morning or late evening sprays are recommended.

When applied by air, pilot should not assist in mixing and loading operations. Apply a minimum of 22.5 L of water per ha (9.1 L/acre) for aerial application.

How it Works:

Lannate is a carbamate insecticide that works by contact and ingestion and has some systemic action. Rapidly degraded in green, growing plants; short term residual. Rapid knockdown.

Restrictions:

Storage: Do not store below 0°C. Store in original container away from other pesticides, fertilizer, food or feed.

Others: Sprays or drift must not contact workers, other persons or animals. The area being treated must be vacated by unprotected persons.

Precautions:

Lannate is of high acute mammalian toxicity. May be fatal or cause blindness if swallowed. Poisonous if inhaled. Do not breathe vapours or spray mist. Do not get in eyes, on skin or on clothing.

Toxic to fish, birds and other wildlife. Keep out of any body of water. Do not apply where run-off is likely to occur. Do not allow to drift from treated areas. Highly toxic to bees exposed to direct application. Do not apply to areas being visited by bees. Time applications to coincide with minimum bee activity.

When mixing, loading or applying Lannate, wear protective clothing, goggles and an approved respirator. Wear clean clothes daily. Wash thoroughly after handling or applying.

First Aid:

If swallowed, drink 1 to 2 glasses of water and induce vomiting. Get medical attention immediately. If inhaled, remove from exposure. If patient is not breathing, begin artificial respiration immediately. In case of contact, wash skin with plenty of soap and water. If in eyes, flush with water for 15 minutes. Remove and wash contaminated clothing before re-use. Atropine sulphate is an antidote.

Hazard Rating:

Danger Poison

Lorsban 4E/Nufos/Pyrinex

Company:

Lorsban-Dow AgroSciences

Pyrinex-United Agri Products

Nufos-Cheminova

Different trade names refer to different companies. Note that products may have different label recommendations. Check your label for more information.

Formulations:

480 g/L chlorpyrifos formulated as an emulsifiable concentrate. Container sizes-10 L jug, 115 L returnable container, 208 L drum.

Insects Controlled and Registered Crops:

CROP	INSECT
Barley, oats, wheat	Army, dark sided, pale western and redbacked cutworms; armyworms, grasshoppers
Wheat	Russian wheat aphid, brown wheat mite, orange wheat blossom midge
Canola	Dark-sided, redbacked, variegated, pale western, and army cutworms; bertha army worm, alfalfa looper, armyworm, diamondback moth larvae, grasshoppers, lygus bug
Flax	Dark-sided, redbacked, varigated, pale western, and army cutworms, armyworm, bertha armyworm
Lentils	Pale western cutworm, grasshoppers
Sunflowers	Redbacked, pale western and army cutworms, sunflower seed weevil
Field and sweet corn	Dark sided, black and redbacked cutworms
Potatoes	Colorado potato beetle (larvae), potato flea beetle, tarnished plant bug, red-backed cutworm, black cutworm, darksided cutworm

Application:

May be applied by air or ground equipment. Ground application only for redbacked cutworm control in corn and sunflower. Ground application only for potatoes. Uniform coverage of the crop is essential in aerial applications. Apply when insects exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for heavy infestations, mature insects, heavy crop canopy, or under dry soil conditions.

How it Works:

Lorsban and Pyrinex and Nufos are broad spectrum, non-systemic insecticides. They work by contact, ingestion and vapour action (inhalation).

Effects of Weather:

Avoid application under hot temperatures. Best results will be obtained when application is made in evening (after 7 p.m.) or morning (before 8 a.m.). Do not apply to plants under extreme drought stress or crop injury may occur.

Tank mixes:

Lorsban 4E may be tank mixed with the following herbicides:

- Avenge 200-C
- Banvel plus 2,4-D amine
- Buctril M
- MCPA ester and amine
- 2,4-D amine and ester

When tank mixing always add the herbicide to the spray tank, then add Lorsban 4E. If Lorsban 4E is added first, settling out may occur causing plugging of lines or nozzles.

Restrictions:

Grazing: Treated cereals grown for cover crop should not be used for human or animal consumption within 60 days of harvest.

Storage: Combustible. Do not store near heat or flame. Do not store with food, feed, drugs or clothing.

Others: Do not use more than 9 applications on potatoes per season.

Do not use more than 5 applications or more than a total of 2.162 L/acre on wheat, barley and oats.

Precautions:

Lorsban 4E and Pyrinex 480 EC and Nufos 4E have a high acute mammalian toxicity. Very toxic to bees, fish, birds, aquatic organisms and other wildlife. May be fatal if swallowed. Causes substantial but temporary eye injury. Harmful if absorbed through skin. May cause skin or eye irritation. Wear protective clothing, impervious gloves and goggles. Wash thoroughly with soap and water after handling and applying. Immediately remove contaminated clothing and wash before re-use. Do not apply or allow to drift on to workers or other persons.

Do not apply directly to water or where runoff could occur to adjacent aquatic sites. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Avoid use when bees are actively foraging

Hazard Rating:

☠ Danger Poison

Insect Control

Malathion/Fyfanon

Company:

Malathion 500E-United Agri Products

Malathion 500-IPCO

Fyfanon-Cheminova

Different companies produce malathion. Note differences in label recommendations. Check your label for more information.

Formulations:

500 g/L malathion formulated as an emulsifiable concentrate.

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for heavy infestations, dense canopy or mature stages of insects.

Insects Controlled and Registered Crops:

CROP OR STRUCTURE	INSECT
Alfalfa, clover	Grasshopper (young), aphid, lygus bug, alfalfa weevil larvae, leafhoppers, alfalfa blotch leafminer, spider mites
Canola	Flea beetle, diamondback moth, grasshopper (young)
Wheat, barley, oats, rye	Grasshopper (young), aphid, true armyworm
Potatoes	Colorado potato beetle, leafhopper, aphid, spider mites
Canaryseed	Aphid
Sweet clover	Sweet clover weevil
Flax, lentils, hay, pasture	Grasshopper (young)
Corn (grain, forage)	Earworms, European corn borers
Beans, peas	Aphids, leafhoppers, spider mites
Empty grain bins, grain elevators, grain box cars, flour mills	Confused flour beetles, flat grain beetles, granary weevils, grain mites, Indian meal moths, lesser grain borers, red flour beetle, rice weevils, rusty grain beetles, sawtoothed grain beetles

How it Works:

Malathion is a non-systemic, contact, organophosphate insecticide and acaricide of brief to moderate persistence. Generally non-phytotoxic.

Effects of Weather:

Apply only when daytime temperatures are above 20°C.

Restrictions:

Grazing: When spraying forages and pastures, cattle should be removed and returned after spraying.

Storage: Do not store near food or feed. Store in a cool dry place but not below -10°C. Protect from heat.

Others: Do not apply to any plant in bloom. Apply to crops when bees are absent from field. Avoid contact with automobile paint and wash immediately if exposure occurs.

Precautions:

Malathion has a low acute mammalian toxicity. Highly toxic to bees and fish. Wear protective clothing to reduce skin and eye exposure.

Hazard Rating:

Caution Poison

Matador

Company:

Syngenta Crop Protection Canada, Inc.

Formulations:

120g/L cyhalothrin-lambda.
Container size-3.78 L (4 x 3.78 L).

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug, tuber flea beetle, Lygus bug
Canola, mustard	Crucifer flea beetle, grasshoppers, Lygus bug, cabbage seedpod weevil
Sunflower	Sunflower beetle
Wheat, barley, oats	Grasshoppers
Unimproved pasture, summerfallow, alfalfa	Grasshoppers
Flax	Grasshoppers
Alfalfa	Alfalfa weevil, Lygus bugs, pea aphid, potato leafhopper
Corn	European corn borer, corn earworm, fall armyworm, cutworms

Application:

Apply by ground only in corn and alfalfa. Application can be made by ground or air for potatoes, canola, mustard, sunflowers, flax, wheat, barley, oats, unimproved pasture, and summerfallow.

Timing:

For potato insects, timing of application should be based on the presence of vulnerable pest developmental stages and significant populations as determined by local monitoring.

For sunflower beetles, use the high rate to control adults.

For flea beetles, to prevent migration of overwintering adults throughout the field, spray a 15 m strip around the field at the first sign of flea beetle feeding.

For grasshoppers, apply the low rate when grasshoppers are up to the 3rd nymphal stage (up to 1 cm in length) or when insect numbers are low. Apply the high rate when insects are larger, up to but not including, winged adults or when insect numbers are high.

How it Works:

A synthetic pyrethroid insecticide. It is a fast acting stomach and contact insecticide effective against a broad spectrum of foliar pests. It has no fumigant or systemic activity.

Effects of Weather:

For best results, apply Matador 120 EC during the early morning before temperatures rise, and during the evening, past the heat of the day.

Tank Mixes:

Matador may be tank mixed with Horizon herbicide.

Restrictions:

Grazing: Do not graze or feed lactating dairy animals on treated green cereal forage or treated pasture.

Storage: Store above 0°C. Storage below 0°C will not impair the effectiveness of Matador 120 EC, however, following such storage, agitate well before use.

Others: Do not apply by air. Do not use more than 3 applications per year. Allow a 7-day interval between applications. Do not apply within 15 m of productive fisheries water, or waterfowl habitat.

Precautions:

Matador has potential for skin and eye irritation. Avoid splashing in eyes or on skin, particularly the face. If hands are contaminated, wash with soap and water before touching other areas of skin. This product is very toxic to bees. Avoid spraying when bees are foraging. Spray deposits should be dry before bees commence foraging in treated crops.

Hazard Rating:

☠ Danger Poison

Methoxychlor

Company:
United Agri Products

Formulation:
240 g/L formulated as an emulsifiable concentrate.

Insects Controlled and Registered Crops:

CROP	INSECT
Beans	Leafhoppers
Potatoes	Blister beetles, Colorado potato beetles, flea beetles, leafhoppers
Alfalfa, Clover	Alfalfa weevil, armyworms, sweet clover weevil, leafhoppers, grasshoppers
Wheat, oats, barley, rye, corn	Armyworms

Application:
Ground application only

Apply in sufficient water to obtain thorough uniform coverage (usually 1000 L of water is required to cover 1 ha).

How it Works:
Methoxychlor is an organochlorine insecticide effective against a wide range of insect pests.

Restrictions:
Storage: Store away from food or feed.

Others: Do not treat alfalfa or clover during bloom.

Precautions:
Avoid inhaling spray mist. Avoid contact with skin, eyes and clothing. Avoid contamination of feed and food. Wash after using.

Methoxychlor is very highly toxic to fish and aquatic invertebrates. Avoid contamination of ponds, lakes, streams, and other bodies of water that contain fish life or which may be used for irrigation or domestic purposes.

Monitor

Company:

Bayer CropScience, United Agri Products

Formulations:

480 g/L methamidophos formulated as a liquid. Container size-10 L pail.

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Bertha armyworm, grasshoppers
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, aphids

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels using sufficient water for good coverage. Use higher rates for mature stages of insects, dense canopy or heavy infestations.

How it Works:

A broad spectrum organophosphorous insecticide and acaricide which works by contact and systemic action. Contact effectiveness may persist for 7 to 21 days.

Restrictions:

Storage: Store in a cool, dry place but not below -10°C. Do not store near food or feed. Protect from heat.

Others: Only 2 applications per season may be made on canola for bertha armyworm and grasshoppers. Highly toxic to bees exposed to direct treatment or residues on crops. Avoid use during flowering and pollination periods. Do not contaminate any bodies of water.

Precautions:

Monitor is of high acute mammalian toxicity and is extremely toxic to fish, wildlife and bees. Poisonous if swallowed, inhaled or absorbed through skin. Rapidly absorbed through skin. Wear an approved respirator, natural rubber gloves, protective clothing and goggles. Wash hands, arms and face with soap and water after handling and applying. Wash all contaminated clothing with soap and hot water before re-use. Keep unprotected persons out of operating or spray areas or where drift could occur.

Do not re-enter treated areas until drifting insecticide and volatile residues have dissipated. Do not store or transport with feed or food.

Hazard Rating:

☠ Danger Poison

Orthene

Company:

Distributed by United Agri Products

Formulation:

75 percent Acephate as a water soluble powder. Container size – case of 12 x 1.5 kg

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	green peach aphid, potato aphid, potato flea beetle, potato leafhopper, tarnished plant bug

Preharvest Interval

Do not apply within 21 days of harvest.

Application:

Apply with conventional ground equipment only. Do not apply by air.

Apply only when insects exceed economic thresholds.

Use higher rate only for heavy infestations.

How it Works:

Acephate is an organophosphate systemic insecticide that works through contact and as a stomach poison.

Effects of Weather:

Do not apply if rainfall is expected within 48 hours after application. Treatment areas should not be irrigated for at least 48 hours after application.

Restrictions:

Storage: Store in cool, dry place, in the original container away from food or feed. Protect from excessive heat.

Environment: Orthene has the potential to leach through soils to ground water. It is recommended that Orthene is not used on coarse textured soils or in areas where the water table may be high.

Do not feed foliage to livestock or allow animals to graze on treated areas.

Do not make more than 4 applications per season.

Others: Orthene is not registered in the United States. Therefore Orthene should not be used on any produce destined for markets in the United States.

Precautions:

Orthene is toxic to birds and mammals.

Orthene is toxic to aquatic invertebrates. Do not apply where runoff or drift is likely to occur.

Orthene is highly toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product or allow it to drift to blooming crops or weeds if bees are foraging in the treatment area. Beekeepers should be warned to protect bees from treated areas for one week after treatment.

First Aid:

If swallowed, induce vomiting and obtain medical attention or call a poison control centre immediately. In case of contact with skin, wash with soap and water. If in eyes, flush with water. See a physician if eye irritation persists. Atropine is an antidote.

Hazard Rating:

☠ Caution Poison

Parathion

This product will no longer be available for use after October 31, 2003 because of the reevaluation decision.

Company:

United Agri Products

Formulation:

960 g/L parathion formulated as an emulsifiable concentrate

Insects Controlled and Registered Crops

Beans	Aphids, leafhoppers, leafminers, thrips
Corn (field and sweet)	Aphids, armyworms, corn earworm, European corn borer, leafminers, thrips
Forage crops and pastures	Aphids, armyworms, blister beetles, leafhoppers
Peas	Alfalfa looper, aphids

Application:

Ground application only. Do not use parathion with ultra low volume hand held sprayers. Do not apply more than twice per season to any crop.

How it Works:

A broad-spectrum organophosphate insecticide

Restrictions:

Reentry period: Do not re-enter treated areas within 48 hours after spraying. If workers must re-enter treated areas between 2 and 14 days after spraying, protective clothing including coveralls over a long-sleeved shirt and long pants, and a chemically resistant hat or hood, chemically resistant (rubber, neoprene) footwear and gloves must be worn.

Storage: Parathion should be stored at temperatures not exceeding 25°C, nor should it be heated above 55°C.

Precautions:

Parathion is toxic to fish and wildlife. Birds and other wildlife in treated areas may be killed. Keep out of any body of water. Do not apply when weather conditions favour drift from treated areas, or when run-off is likely to occur.

Do not mix, load or apply indoors. Always work to the windward side when handling or spraying parathion. Do not use parathion on excessively hot days.

Before removing gloves after contacting parathion, wash them with soap and water.

Immediately after working with parathion, workers must wash entire body with soap and water and change into clean clothing. Wash protective clothing separately from other household laundry with heavy-duty detergent and hot water.

If symptoms of parathion poisoning such as headache, nausea, trembling, blurred vision, etc. develop while using parathion, stop work immediately and seek medical attention.

Hazard Rating:

☠ Danger Poison

Pirimor

Company:

Syngenta Crop Protection Canada, Inc.

Formulation:

50 percent pirimicarb formulated as a dry flowable. Container sizes-10 x 1 kg bags.

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Green peach aphid, potato aphid, buckthorn aphid
Peas	Pea aphid
Sweet corn	Aphids

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use higher rates when insect populations are high or when very cool weather is prevailing.

How it Works:

A fast-acting aphicide that works by contact, vapour and local systemic action.

Restrictions:

Storage: Store in original container in a dry place. Highly flammable.

Others: Do not contaminate any bodies of water.

Precautions:

Pirimor is of high acute mammalian toxicity. Avoid breathing dust or spray mist. Avoid contact with skin and eyes. Harmful to livestock. Avoid contamination of food or feed, ponds, lakes and waterways. Wear suitable gloves, protective clothing and an eye protector.

Hazard Rating:

☠ Danger Poison

Pounce

Company:

Distributed by United Agri Products

Formulations:

384 g/L permethrin formulated as an emulsifiable concentrate. Container size-1 L (12 x 1L).

Insects Controlled and Registered Crops:

CROP	INSECT
Cereals, canola, corn, flax, lentils, peas, potatoes, sunflowers,	Redbacked cutworm, Pale Western cutworm European corn borer, corn earworm, Fall armyworm
Potatoes	Colorado potato beetle, potato flea beetle, potato leafhopper, tarnished plant bug, variegated cutworm

Application:

Apply Pounce by ground only. Apply when insects exceed economic threshold numbers and use sufficient water for good coverage. Use higher rates for heavy infestations, adult insects and dense foliage. For cutworm control application should be made under warm, moist conditions in the evening or at night. Use high rates if larvae are near maturity or soil conditions are dry. Do not disturb soil surface for five days after treatment.

How it Works:

Pounce is a synthetic pyrethroid insecticide. It is a stomach and contact insecticide with no systemic or fumigant effects.

Restrictions:

Grazing: Cover crops or crops treated with Pounce should not be used as a green feed for animals.

Storage: Store above 0°C.

Others: Observe a 16 yard (15 m) setback distance for ground and 110 yard (100 m) setback distance by air near water bodies or other sensitive areas.

Precautions:

Pounce is of low acute mammalian toxicity. Both are very toxic to bees and fish. Do not contaminate ponds, lakes or streams while filling sprayer or spraying. Avoid spraying when bees are foraging.

Hazard Rating:

☠ Caution Poison

Ripcord

Company:

BASF Canada

Formulation:

407 g/L cypermethrin formulated as an emulsifiable concentrate.

Container size-1 L

Insects Controlled and Registered Crops:

CROP	INSECT
Wheat, barley	Grasshoppers, cutworms
Canola	Grasshopper, flea beetle, bertha armyworm
Roadsides, headlands, summerfallow	Grasshopper
Sunflower	Sunflower beetle, sunflower seed weevil
Corn	European corn borer, cutworms, corn earworm
Potatoes	Colorado potato beetle, flea beetle, leafhopper, tarnished plant bug, cutworms

Application:

Ripcord may be applied by ground application only for control of grasshoppers on wheat, barley, roadsides, headlands and canola; for flea beetle control on canola; and for control of cutworms.

Ripcord may be applied by ground or air for bertha armyworm, sunflower beetle, sunflower seed weevil, corn earworm, European corn borer and Colorado potato beetle, flea beetle, leafhoppers and tarnished plant bug on potatoes. Only 1 aerial application is permitted per season for bertha armyworm on canola and sunflower beetle and seed weevil on sunflower, and 2 applications per season for corn and potatoes.

Observe a 16 yard (15 m) setback from water bodies and other sensitive areas when applying Ripcord with ground application. Observe a 110 yard (100 m) setback from water bodies and sensitive areas when applying by air.

Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use higher rates for mature insect stages (grasshoppers) or severe infestations.

How it Works:

A pyrethroid insecticide that works as a contact and stomach poison.

Effects of Weather:

Activity of Ripcord on grasshoppers is reduced as soil temperature increases. Application for grasshopper control should be made at temperatures below 25°C. Spraying for grasshoppers should be delayed until evening if daytime temperatures are above 25°C.

Restrictions:

Grazing: Treated crops must not be grazed or cut for hay.

Storage: Keep in original container during storage. Do not contaminate or store near foodstuffs.

Precautions:

Ripcord is of low to moderate acute mammalian toxicity and very toxic to bees, fish, and aquatic organisms. Harmful or fatal if swallowed. May be harmful if absorbed through skin.

Severely irritating to eyes. Causes skin irritation and sensitization. Wear long-sleeved protective clothing and gloves when handling or applying. Wear face shield or goggles when mixing. Do not apply where streams, lakes and ponds may be contaminated. Avoid spraying when bees are foraging.

Hazard Rating:

Caution Poison

Sevin XLR Plus

Company:

Bayer CropScience

Formulation:

480 g/L carbaryl formulated as a liquid suspension (Sevin XLR Plus).

Container size-Sevin XLR Plus-10 L jug.

Insects Controlled and Registered Crops:

CROP	INSECT
Canola	Flea beetle
Alfalfa, clover	Grasshopper, blister beetle, leafhoppers
Barley, oats, rye, wheat	True armyworm, grasshopper
Ditchbanks, field borders, forage grasses, headlands, pastures, rangelands, rights-of-way, wastelands	Grasshopper
Corn (field and sweet)	European corn borer, corn earworm, grasshopper
Potatoes	Colorado potato beetle, flea beetle, leafhopper
Beans	Leafhoppers, lygus bugs

Application:

May be applied by air or ground equipment. Apply when insect numbers exceed economic threshold levels and use sufficient water for good coverage. Use lower rates on young plants and early stages of insects and higher rates on mature plants and advanced stages of insects, or mature insects.

Dilutions of 1 volume of XLR Plus with 1 volume of water will allow maximum resistance to wash off by rainfall. Application to dry foliage will ensure greater wash off resistance.

How it Works:

A carbamate insecticide that works by contact and ingestion. Moderate to rapid in speed of action with short to moderate residual activity (2 to 4 weeks).

Restrictions:

Storage: Do not store in areas where temperatures frequently exceed 38°C. Store in original container in a cool dry area out of reach of children and animals and away from food and feed.

Others: Remove cattle from area when spraying.

Precautions:

Sevin is of moderate acute mammalian toxicity. This product is highly toxic to honeybees exposed to direct treatment on blooming crops or weeds. Harmful if inhaled or swallowed. Avoid contact with skin and eyes. Wear long-sleeve work clothing and change to clean clothing daily. Wash hands and face after handling. Avoid contamination of food, feed, water supplies, streams and ponds.

Hazard Rating:

◈ Warning Poison

Thimet 15G

Thimet will no longer be available for use on beans after December 31, 2003.
Thimet will no longer be available for use on potatoes after December 31, 2004.

Company:

BASF Canada

Formulations:

15 percent phorate formulated as a granular. Container size-20 kg bag.

Insects Controlled and Registered Crops:

CROP	INSECT
Potatoes	Aphids, leafhoppers, reduction of potato flea beetle and wireworm damage, and early season control of Colorado potato beetle
Beans	Leafhoppers, aphids, lygus bugs, thrips, mites

Application:

Ground application at seeding time: Distribute granules evenly in furrow or granules may be banded on each side of the row at planting time. Use low rate for sandy or light soils and high rate for silt or heavy soils. Works as a systemic poison with effective initial residual activity on soil and foliar insects.

How it Works:

An organophosphate insecticide that works as a systemic poison, with effective initial residual activity on soil and foliar insects.

Restrictions:

Storage: Do not store in or around the home. Store away from food or feed. Store open bags in labelled sealed drums or heavy plastic bags.

Others: Do not use in muck soils. Do not apply later than at planting time. Will provide reduction of potato flea beetle and wireworm damage and early season potato beetle control.

Precautions:

Thimet is of high acute mammalian toxicity and is highly toxic to fish, birds and other animals. Do not allow product to contact eyes and skin. Poisonous by skin contact, inhalation or swallowing. Repeated inhalation or skin contact with Thimet 15G, other organophosphorus or carbamate insecticides may, without symptoms, progressively increase susceptibility to poisoning. Wear freshly-laundered, long-sleeved work clothing daily. Use rubber gloves when transferring from package to equipment. Sleeve cuffs should be worn over gloves to prevent granules from falling into the gloves. Rubber gloves should be washed with soap and water after each use. Destroy and replace gloves frequently. In case of contact, immediately remove contaminated clothing and wash skin thoroughly with soap and water. While emptying bags into equipment, pour downwind and allow as little free fall as possible. The use of a dust mask is recommended.

Hazard Rating:

☠ Danger Poison

Insect Control in Stored Grain

Prevention

Clean Storage Facilities. Storage and transport facilities should be cleaned thoroughly and sprayed or dusted, if needed, with a recommended insecticide before storing grain in the bin (e.g. malathion or Protect-It diatomaceous earth-refer to label for details). Clean storage will eliminate one source of infestation. However, grain stored for long periods of time still has the potential for renewed infestations.

Dry and Cool Grain. Ideally, the grain should be dry before being put into storage, and cooled as quickly as possible. Aeration systems used during the night immediately after harvest should have the grain below 20°C in 2 weeks. Grain insects cannot multiply at these temperatures. Cooling the grain, through aeration, or moving the grain several times during mid-winter should provide effective control of rusty grain beetles.

Identification of the pests

Regular monitoring of the stored grain is the next step in determining the presence and potential for serious infestations. Either the presence of insects or damaged kernels will give an indication of a problem. Probably the most sensitive means of detecting insects in stored grain is through the use of probe traps, available from Hedley Technologies Inc. Often the first indication of an infestation will be found near the top centre of a storage bin. As with other insect pests, correct identification of insects present can be important in determining the problem and possible solutions. There are several insects that can be found in stored grains in Manitoba and Saskatchewan. Some of these insects feed on the grains, while others feed on fungus that may be developing in the stored grain.

Grain feeders: Insects that feed on the grain include rusty grain beetles, red flour beetles, and saw-toothed grain beetles. The **rusty grain beetle** is the most common stored product insect. The adult is a flat, rectangular, reddish brown beetle, 2 mm long, with long threadlike antennae. Heavy infestations of this insect cause grain to heat and spoil. The **red flour beetle** is the another common insect pest of stored grain in the prairies. Adults are reddish-brown and 4 mm long. Red flour beetles cannot feed on undamaged, dry seed with less than 12% moisture content. They prefer grain dust, broken grain and milled stocks. Red flour beetles can be controlled by moving grain, whether or not it is cold. Adult **saw-toothed grain beetles** are brown, about 3 mm long, and have six teeth-like projections on each side of the thorax. Saw-toothed grain beetles are more common in stored oats than in stored wheat and barley.

Fungus feeders: Insects that feed on fungus in the grain bin include the foreign grain beetle, psocids, and grain mites. Adult **foreign grain beetles** are brown, and about 2 mm long. They resemble the rusty grain beetle, but can be distinguished from it by club-shaped antennae. Also, when placed in a glass jar, foreign grain beetles will climb up the sides, while rusty grain beetles cannot. **Grain mites** are whitish, soft-bodied, and about 0.2 to 0.5 mm long. They can be hard to see with the naked eye. About eight kinds of mites are common in farm granaries and elevators. **Psocids** are soft-bodied insects, about 1 mm long, with long antennae relative to the body size.

Fungus feeding insects and mites cannot survive in dry grain. Chemical control is not necessary for fungus feeding pests in stored grain. Practices that result in the grain drying may be all that is needed to control such pests.

Control Techniques:

The Canada Grain Act states there is zero tolerance for any primary insects (those that feed on whole, sound grain) in grain delivered to elevators. Outlined below are some control techniques and when and how these techniques can be best used.

Cold Temperatures. Rusty grain beetles are cold hardy and can survive subzero temperatures. Rusty grain beetles and other stored grain insects can be killed by reducing core grain temperatures as follows:

Grain Temperature	Time Required to Kill Insects
-5°C	6 weeks
-10°C	4 weeks
-15°C	2 weeks

It is important to note that maintaining core grain temperatures below 18°C will stop beetles from reproducing and laying eggs, and below 15°C will limit movement and feeding activities.

Moving Grain with Pneumatic Conveyors. Moving the grain using pneumatic conveyors (grain vacs) has also been shown to be an effective means of controlling free-living insects in stored grain.

Phostoxin

Company: Degesch America Inc. (Phostoxin)

Formulation: 55 percent aluminum phosphide.

Formulation	Primary Use	Container Size
Phostoxin tablets (3g each)	On the farm or country elevator	500 tablets
Phostoxin pellets (0.6g each)	In terminals	2500 pellets
Phostoxin tablets prepac	In rail cars, containers	4 strips of 33 tablets to a pouch

Insects controlled: Rusty grain beetle, red flour beetle, saw-toothed grain beetle, granary weevil, Indian meal moth and yellow mealworm.

Approved for use on the following stored grains: Barley, corn, dried peas, lentils, oats, rice, rye, soybeans, sunflower seeds, triticale and wheat.

Restricted Product: As of November 1997 the use and sale of Aluminum Phosphide (Phostoxin) became restricted to licensed pesticide applicators possessing a valid fumigation licence (Saskatchewan) or stored agricultural products license (Manitoba).

Rate and Minimum Exposure Period: Refer to labels to determine rate. For grain bins a dosage of 250-500 tablets (or 880-2560 pellets) per $100m^3$ of bin space being treated (not volume of grain) is recommended. Use higher doses for leaky bins, and lower rates for tight bins.

The following table may be used as a guide to determine the minimum length of exposure period to phostoxin and gastoxin at the indicated temperatures:

Temperature	Exposure Period
Below 5°C (40°F)	Do not fumigate
5°C-12°C (40°-53°F)	10 days
13°-15°C (54°-59°F)	5 days
16°-20°C (60°-68°F)	4 days
above 20°C (68°F)	3 days

If the grain is less than 5°C then the tablets will not release the gas until the grain temperature warms up. This may result in poor control and accidental exposure to phostoxin or gastoxin at a later date in grain handling facilities. Very dry grain will also slow the release of the gas from the pellets. A shortened exposure period cannot be compensated for by increased dosage.

Cost: $75/500 tablets; $75/2500 pellets; $45/pouch (132 tablets/pouch)

Protect-It

Company: Hedley Technologies Inc.

Formulation: 90 percent Diatomaceous Earth (DE) and 10 percent Amorphous Silica

Insects controlled: Rusty grain beetle, rice weevil, granary weevil, Angoumois grain moth, Mediterranean flour moth, Indian meal moth, red flour beetle and Tribolium.

Approved for use on the following stored products: Feed grains, seed, stored grains, wheat, barley, buckwheat, corn, oats, rye, flax, peas, soybeans and sorghum. Also registered for structural treatment of empty grain storage and transportation containers.

Protect-It must be applied to grain as it is being loaded into the bin. Protect-It damages the cuticle of the insect, reducing the insect's ability to retain moisture. The insect eventually dies from dehydration The grain must be warm enough for the insects to still be moving for the DE to be effective, and it is most effective when used in dry grain. Tough or damp grain (>16 percent moisture content) will provide insects with a humid environment, which diminishes the desiccating effect of DE.

Rate and Cost : The application rate for Protect-It varies by crop and insect species, ranging from 100 g/tonne for control of rusty grain beetle in wheat to 1000g/tonne for red flour beetle in corn. Refer to the label for details. Cost=$10.10/kg.

If desired, Protect-It treated grain can be processed or fed to livestock immediately after treatment.

The application of DE will lower the test weight measurement of the grain, but usually not to the point of downgrading. If test weight loss is excessive, the grain can be diluted with untreated grain. DE is non-toxic to humans and animals.

To kill insects in empty storage bins, elevators, mills, warehouses, truck-trailers, rail cars, ships and processing facilities:

Dusting- Use a dust blower or aeration fan to get Protect-It into the cracks, crevices and void spaces of the structure being treated. Dust areas at a rate of 1 kg per 200 square metres (5 g/m^2).

Spraying- Mix 3 kg Protect-It into 20 litres of water. Spray area at a rate of 10 litres per 200 square metres (50 mL/m^2).

More information on the application of Protect-It can be found at:
http://www.hedleytech.com/cdnapplication.html

Malathion Grain Protectant Dust

Company: Interprovincial Co-operative, United Agri Products

Formulation: 2 percent malathion

Insects controlled: confused flour beetles, flat grain beetles, granary weevil, Indian meal moth, lesser grain borer, rusty grain beetle and sawtoothed grain beetle.

Approved for use on the following stored grains: Wheat, rye, barley and oats as stored grains.

Malathion Grain Protectant can be applied to grain as it is being loaded into a bin or being turned by adding gradually at the grain auger. It can also be used to control surface infestations by applying to the grain surface and raking in to 15 cm depth of the grain. Malathion controls insects by ingestion and contact and insects must be active for it to be effective.

Rate and Cost:

Crop	Rate – g/1000 kg (tonne) grain	Cost/1000 kg grain
Wheat	415	$1.19
Rye	450	$1.29
Barley	520	$1.49
Oats	735	$2.10

Do not apply to grain within 7 days of sale.

Be aware that the Canadian Grain Commission allows only 8 ppm of malathion residues in stored grains.

Malathion 500, Malathion 500 E, Fyfanon

Refer to labels for these products for insect and mite control in *empty* grain bins, grain elevators, grain box cars and flour mills.

Malathion 500 (IPCO)

Insect	Rate	Cost	Note
Rusty grain beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer (empty grain bins)	250-300 ml/5 L of water on 100m^2	$3.16-$3.80/ 100m^2	May be used within 1 day of grain storage

Malathion 500E (United Agri Products), Fyfanon (Cheminova)

Insect	Rate	Cost	Note
Rusty grain beetle, red flour beetle, sawtoothed grain beetle, confused flour beetle, grain mite, granary weevil, Indian meal moth, lesser grain borer, flat grain beetles, rice weevils (empty grain storage facilities)	333 ml/5L of water on 100 m^2	$4.10/ 100m^2	Wait until spray has thoroughly dried before storing grain in treated areas.

Notes

Notes

2003 Forage Crops Chart – Recommended Herb

CROPS AND WEEDS / HERBICIDES	Weed Resistance Grouping	CROPS (S = seedling only; E = established only; X																		
		GRASSES																		
		Annual Ryegrass	Altai Wild Rye Grass	Bromegrass	Creeping Red Fescue	Crested Wheatgrass	Intermediate Wheatgrass	Kentucky Bluegrass	Meadow Fescue	Meadow Foxtail	Northern Wheatgrass	Orchardgrass	Pubescent Wheatgrass	Reed Canarygrass	Russian Wild Ryegrass	Slender Wheatgrass	Streambank Wheatgrass	Tall Fescue	Tall Wheatgrass	Timothy
◈ 2,4-D[7]	4	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]	X[8]
⊛ 2,4-DB[7]	4			S[4]	S[4]	S[4]	S[4]		S[4]			S[4]					S[4]	S[4]	S[4]	S[4]
▽ ACHIEVE 80 DG	1			X[2]	X[2]	X[2]	X[2]				S[4]					X[4]				X[3]
▽ ALLY	2				X[2]	X	X					X								
▽ ASSERT		X[2]																		
— ASSURE II	1				X[2]															
⊛ ATTAIN																		X[2]		
◈ AVADEX BW	8																			
◈ AVENGE	8			S[1]	S[1]	S[1]		S[1]	S[1]			S[1]		S[1]	S[1]					S[1]
▽ BANVEL II + 2,4-D	4			S	S	S	S		S	S		S	S			S	S	S	S	S
▽ BASAGRAN	6			S[2]	S[2]	S[2]				S[2]		S[2]								S[2]
◈ BUCTRIL M/MEXTROL	4,6													S[2]	S[2]	S[2]			S[2]	X
— EDGE	3																			
▽ EPTAM 8-E	8																			
— HOE-GRASS 284	1			S[4]	S[4]	S[4]	S[4]								S[4]					
▽ HOE-GRASS II	1,6			S[2]	S[2]	S[2]	S[2]								S[2]					
— KERB	15																			
▽ LONTREL	4		X	X	X	X	X	X	X	X		X		X	X	X	X	X	X[5]	X
◈ MCPA[7]	4	X[8]		X[8]	X[8]	X[8]	X[8]	X[8]	X[8]			X[8]		X[8]	X[8]	X[8]			X[8]	X[8]
⊛ MCPB + MCPA	4		S[4]	S[4]	S[4]	S[4]	S[4]		S[4]		S[4]		S[4]	S[4]	S[4]	S[4]	S[4]	S[4]	S[4]	S[4]
◈ ODYSSEY																				
⊛ PRESTIGE																		E[2]		
◈ PARDNER	6			S[2]	S[2]	S[2]	S[2]		S[2]			S[2]		S[2]	S[2]	S[2]			S[2]	S[2]
▽ POAST ULTRA	1				X[2]															
▽ PRINCEP NINE-T/SIMAZINE	5																			
— PURSUIT	2																			
— REFINE EXTRA TOSS-N-GO	2			X	X	X	X	E			X	X	X			X	X	X	X	
— SELECT	1																			
◈ STAMPEDE EDF (no tank mix)								X[2]												
▽ TARGET	4			X[9]	X[9]	X[9]	X[9]	E[9]	E[9]	E[9]		X[9]	E[9]			E[9]	E[9]	E[9]	E[9]	X[9]
— TRIFLURALIN	3																			
◈ TRIUMPH PLUS	1,2,4			S[4]	S[4]		S[4]				S[4]					X[4]		S[4]	S[4]	
— VELPAR L	5																			
▽ VENTURE	1				X[2]															

Poison Hazard
See Safe Use of Herbicides, Fungicides and Insecticides Section in *2003 Guide to Crop Prot*

⊛ Danger ◈ Warning ▽ Caution

— No warning symbol required

rbicides

only; X = seedling or established)															WEEDS																																																				
		LEGUMES								COVER CROPS					GRASSES						BROADLEAF WEEDS																																														VOL
Timothy	Western Wheatgrass	**Alfalfa**	Alsike Clover	Cicer Milkvetch	Red Clover	Sainfoin	**Sweet Clover**	Trefoil, Bird's-foot	White Dutch Clover	Barley	Flax[1]	**Oats**	Canola	Wheat	Barnyard Grass	Foxtail Barley	**Foxtail, Green**	Foxtail, Yellow	Quackgrass	Wild Oats	Bindweed, Field	**Bluebur**	Buckwheat, Wild	Burdock	Catchfly, Night-flowering	Chickweed	**Cleavers**	Cockle, Cow	Cocklebur	Dandelion	Dock, Curled	**Flixweed**	Goat's-beard	Goosefoot, Oak-leaved	Hawk's-beard, Narrow-leaved	Hemp-nettle	**Knotweed, Prostrate**	Kochia	Lamb's-quarters	Lettuce, Prickly	Mustard, Ball	**Mustard, Dog**	Mustard, Hare's-ear	Mustard, Indian	Mustard, Tumble	Mustard, Wild	**Mustard, Wormseed**	Pigweed, Prostrate	Pigweed, Redroot	Pigweed, Russian	Plantain, Common	**Purslane**	Radish, Wild	Ragweed, Common	Ragweed, False	Ragweed, Giant	**Russian thistle**	Scentless Chamomile	Shepherd's-Purse	Smartweed, Lady's-Thumb	Sow Thistle (Annual)	**Sow Thistle (Perennial)**	Stinkweed	Sunflower, Prairie/Annual	Sweet Clover, White	Thistle, Canada	**Cereal Grains (Wheat, Barley)**
X[8]	X[8]									X				X								•							•	☐	•	•[g]			•[g]			•	•	•	•	•	•	•	•	•	•	•	•	•				•	•	•	•		•[g]			☐	•[g]			☐	
S[4]		S	S		S			S	S	X		X		X							•		•							☐	S			•	•				•		•					•	•		•		•			•	•	•			•	S		S	•			☐	
X[2]	S[4]	S[1]	S[1]	S[1]	S[1]	S[1]	S[1]	S[1]	S[1]	X				X	•		•	•		•																																															
										X				X								•	S			•		•				•				•		•	S		•					•		•	•								S	•	•	•	S	S	•			S	
																				•			S																							•																	•				
		X[1]	S[2]	S	S[2]		S[2]	S[2]	S[2]		X		X		•		•			•																																															•
																					•[h]	•	•	•		S	S		•	•[g,h]	•[h]	•		•[h]		S		•	•	•[h]	•	•[h]	•	•	•	•	•		•[h]					•	•	•	•[h]		•	•[h]	S	S	•	•		S	
		S[1]	S[1]		S[1]		S[1]	S[1]		X	X		X	X						•																																															
S[1]		S[1]			S[1]		S[1]	S[1]		X				X[10]						•																																															
S										X				X									•	•			•	•	•			•						•											•	•			•				•		•	•		☐		•		☐	
S[2]		X[2]	S[2]		S[2]	X[2]	E[2]				X										☐					•	•		•										•							•			•			•	•	•		•	•		•	•			•			☐	
X										X	X	X		X								•	•		•			•	•			•						•	•		•					•	•		•[f]					•			•	•[g]	•	•		☐	•	•		☐	
		S[2]											X		•		•	•		•			•			•	S	•								S		•	•									•	•			•					S			S							•[e]
		S[2]						S[2]							•		•	•								•													•									•	•			•															•
		S[4]	S[2]		S[4]	S[2]	S[4]			X	X		X	X	•		•	•		•																																															
															•		•	•		•			•		•			•										•	•							•			•								•	•		•			•				
		E						E								•				•						•																																									•
X										X	X	X	X	X									•																																			•				☐				•	
X[6]		S[5,6]	S[5]		S[5]					X	X	X		X								•		•					•		•	•		•		S[g]		•	•	•	•	•	•	•	•	•	•		•	•				•	•	•	☐		•[g]		☐	☐	•[g]			☐	
S[4]	S[4]		S		S				S	X		X		X							☐										•					S			•		•					•	•		•		•		S	•	•	•			•		S	☐	•			•	
		X[2]															•			•			•				•					•					•	•	•							•			•								•			•							•
																							•			S	•			•[g]		•[g]				•		•	•							•			•	•									•	•	•	S	•			S	
S[2]		S								X	X	X		X								•	•					•	•									•	•							•			•					•			•			•			•				
		X	X	X		X	X				X		X		•	S	•	•		•																																															•
		E						E							•			•		•			•																•													•		•	•	•				•					•		
		X[10]											X[11]				S																						S							•			•										S	•			•				
	X									X		X		X									•			•	S	•				•				•		•	•		•					•			•								•	S	•	•		S	•	•		S	
		S									X		X		•		•	•		•																																															•
																	S																																																		
X[9]	E[9]									X		X		X							☐		•		•		•	•				•				•	•	•	•		•					•	•	•	•					•			•		•	•	•	☐	•			☐	
		S[13]	S[14]	S[14]	S[14]	S[12]	S[13]	S[14]			X[1]		X		•		•	•		•			•			•		•									•		•										•			•					•										
	S[4]													X			•	•		•			•	•		•		•	•			•[g]				•		•	•	•	•		•	•	•	•	•		•	•	☐		•	•	•	•	•		•[g]	•			•[g]	•		☐	
		E[2]																												☐					•																							•				☐					
		X			X[4]			X[4]			X		X		•		•	•		•																																															•

REFER TO THE 2003 GUIDE TO CROP PROTECTION AND PRODUCT LABELS FOR COMPLETE DETAILS

					VOLUNTEER CROPS				
Sow Thistle (Perennial)	Stinkweed	Sunflower, Prairie Annual	Sweet Clover, White	Thistle, Canada	Cereal Grains (Wheat, Barley)	Cereal Grains (Oats)	Flax	Canola	Alsike Clover
☐	●g			☐					
S	●			☐					
						●			
S	●			S			S	●a	
	●								
					●	●			
S	●	●		S			●	●	
☐		●		☐				●	
	●			☐					
☐	●	●		☐				●	
					●e				
					e	●			
	●								
					●	●			
☐				●					●
☐	●g			☐					
☐	●			●				●	
					●	●		●a	
S	●			S			●	●	
	●								
					●	●			
			●						●
	●							●a	
S	●	●		S				●a	
					●	●			
☐	●			☐				●	
	●g	●		☐				●a	
☐									
					●	●			

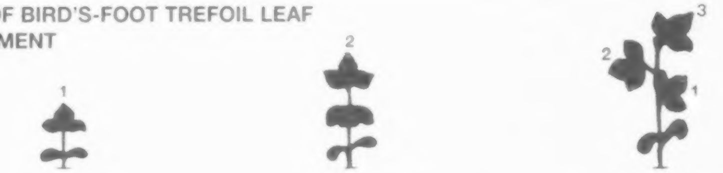
NOTES: CROPS

1. Underseeded only.
2. For seed production only.
3. Seedlings for seed production only. Established for seed or forage.
4. Do not graze or harvest for livestock in the year of treatment.
5. Use MCPA sodium salt on seedling forages only when underseeded to flax, oats, wheat or barley. Do not use on Flemish varieties of alfalfa.
6. For use as a spot treatment only to control red bartsia.
7. Apply the fall prior to seeding.
8. Not all products registered for crops and weeds indicated. Check product labels.
9. For forage production only.
10. Check recommendations for varietal restrictions.
11. CLEARFIELD varieties only.
12. Liquid formulations in spring only.
13. Advance 10G, Bonanza 10G, Treflan E.C. (spring only), Treflan QR5 only.
14. Treflan E.C. in spring only.
15. Seed production only. Apply to seedling stands that will be in production for three years after application and established stands that will be in production for 2 years after application.
16. May not include solin. Check product label for restrictions.

LEGEND: WEEDS

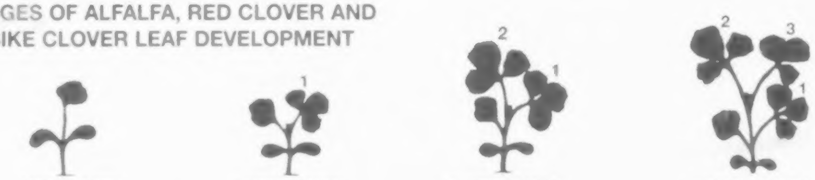
●	Controlled by rates recommended for crops. Where more than one brand is recommended, the weed may not appear on all labels.
☐	Top growth suppression only.
S	Suppression.
a	Will not control CLEARFIELD varieties.
b	Do not use the quackgrass rate in seedling sweet clover or seedling alsike clover.
d	Controlled by MCPAK only.
e	Controls volunteer wheat, suppresses volunteer barley.
f	Controls redroot pigweed only when a cereal cover crop is used.
g	Spring seedlings only.
h	Controlled only when growing rapidly.

STAGES OF BIRD'S-FOOT TREFOIL LEAF DEVELOPMENT



1 TRIFOLIATE 2 TRIFOLIATE 3 TRIFOLIATE

STAGES OF ALFALFA, RED CLOVER AND ALSIKE CLOVER LEAF DEVELOPMENT



UNIFOLIATE 1 TRIFOLIATE 2 TRIFOLIATE 3 TRIFOLIATE

For information on pasture weed control, consult the "Weed Control in Pastures and Hayfields" table in the *2003 Guide to Crop Protection.*

Pesticide Tank Mix Combinations

Tank mixes listed for products in the main section of the book are those found on a particular product's label only. This chart cross-references all possible pesticide tank mix combinations.

"X" or "C" indicate registered mixes. Recommendations are either common to both products (X) or the exclusive registration of the product in the column on the left side of the chart (C)

Instructions

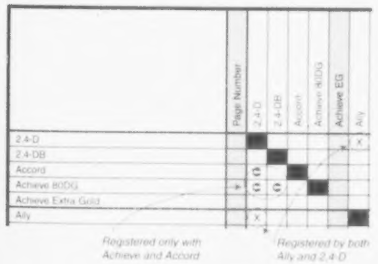
To find **all** potential mixes for a specific product, find marked squares following both rows and columns indicated by that product.

To find additional mixes for a product recommended by other products, but not recommended on its own label:

1. Find the product in the top row.
2. Mixes in that column will either be common to both products (X) or a mix registered only by the product in the column on the left side of the chart (C).
3. To see the recommendations for the mix, go to the page number shown for the product in the column on the left side of the chart.

Mixes appearing in the same row as the product are those that are recommended on that product's label.

Where mixes are marked with "C", the manufacturers of the product listed in the column at the left of the chart is responsible for the performance of the mix.


Page Number
2,4-D
2,4-DB
Accord
Achieve 80DG
Achieve EG
Ally
2,4-D
2,4-DB
Accord
Achieve 80DG
Achieve Extra Gold
Ally
Registered only with Achieve and Accord
Registered by both Ally and 2,4-D

	Page Number	2,4-D	2,4-DB	Accord	Achieve 80DG	Achieve Extra Gold	Ally	Assert	Assure II	Atrazine	Attain	Avadex	Avenge	Banvel II	Basagran	Buctril M	Curtail M	Dichlorprop/2,4-D	Dual II	DyVel	DyVel DS	Eptam	Eradicane	Everest	Express Pack	Frontline	Frontline 2,4-D	Fusion	Glyphosate	HoeGrass 284	Hoegrass II	Horizon	Liberty	Linuron	Lontrel	MCPA	Mecoprop	Muster	Odyssey	Pardner	Pinnacle	Poast Ultra	Prestige	Primextra Light	Puma120 Super	Pursuit	Refine Extra	Reflex	Select	Sencor	Stampede EDF	Target/Sword	Thumper	Trifluralin (liquid & DF)	Triumph Plus	Unity	Insecticides	Decis	Lorsban/Pyrinex/Nufos	Ripcord
2,4-D		■					X	X					X	X																																	X													
2,4-DB			■																																X																								
Accord		C		■								X			X									C											C											X													
Achieve 80DG		C	C		■					X					X	X	X																	C	C				X			X										X					C		
Achieve Extra Gold						■																													C																						C		
Ally		X					■		X				X																		X				C									X															
Amitrol																												C																															
Assert		X						■			X						X	X							X										C							X				X									C				
Assure II							X		■																												X			X																			
Atrazine										■				C					X				X										X						X																				
Attain					X			X																							X													X															
Avadex (liquid formulations)												■																																									X						
Avenge		X	C	X			X						■			X	X	X																	X				X							X						X							
Banvel II		X					C							■														X							X													X										
Basagran		C													■																								X							X												
Buctril M				X	X		C			C			X			■											X				X				C						X					C		X											
Champion™ Extra																																			C																							
Curtail M					X			X					X				■														X															X													
Dichlorprop/2,4-D*					X			X					X					■													X																												
Dual II										X									■																																							
DyVel																				■				X								X																											
DyVel DS										C											■			X																																			
Eptam																						■																											X				X						
Eradicane										X									C				■																																				
Escort		C																																																									
Everest		C					C				C					C	C	C		X	X			■	C		X									C				C			C				C					C	C			C				
Express Pack (Express + 2,4-D LV Ester)								X						C											■										C**								X						C**										
Freedom Gold																																		C																								
Frontline								C																	■						C																												
Frontline 2,4-D																							X			■																																
Fusion															X												■							X	C		C																						
Glyphosate		C							C	C				X		C												■						X	C				X																				
Harmony Total																																			C																							
HoeGrass 284																													■										X																				
Hoegrass II																														■					C																						X		
Horizon		C					X				X					X	X	X		X												■			C	C				C			X				X					X	X			C		C		
K2		C																																																										
Laser DF		C																																C																								
Liberty																																■																X											
Linuron										X									C														■		X								C																
Lontrel		C	C																								X	X	C					■	C						X					X		X						X					
MCPA													X	X																			X		■				X										X										
Muster									X																												■			X																			
Odyssey																																		X				■																					
Pardner		C			X					X			X	C															X	X						X				■																				
Pinnacle									X						X																									■																			
Poast Ultra																X																	C		X	C		X				■				C														
Prestige					X			X																							X											■		X															
Puma™ Super		C					X				X					C	C	C		C	C				X										C	C	C						X		■		X						X			C				
Refine Extra		X		X				X					X				X														X			X	C											■													
Reflex															X																																■												
Select																X																	X		X	C		C								C			■											
Sencor		C												X								X														X														■		X		X							
Spectrum								C																							C																													
Stampede EDF		C																																	C											C				■							X		
Sundance		C														C																			C				C																				
Target/Sword																															X		C																X		■								
Thumper					X								X																		X													X								■							
Trifluralin (liquid & DF)												X										X																												X				■						
Triumph Plus																																		X																				■					
Unity		C																																C	C																			■				
Venture			C				C																											C			C																						
Fungicides																																																											
Tilt		C														C																			C				C																				C
Insecticides																																																								■			
Decis		C												C		C														C	X					C				C												X							■		
Lorsban		C											C	C		C																			C																							■	

- * Not all mixes registered with all products. See product page for details.
- X Mix is recommended by both products
- C Mix is recommended by the product on the left of the chart only.
- ** Only in the mix of Express DF + Sencor/Evict + MCPA. 2,4-D not included.

Weatheradio Canada

Weatheradio is a network of radio stations operated by the weather service of Environment Canada which transmits weather information continuously over VHF-FM radio. The service operates 24 hours each day, seven days a week, providing up-to-the minute weather forecasts and reports detailed to each broadcast area.

Weatheradio is transmitted from nine locations in Saskatchewan:

- Prince Albert, Stranraer, Regina Beach and Midale on frequency 162.400;
- Regina, Swift Current, Yorkton and Saskatoon at 162.550; and
- North Battleford at 162.475.

Medicine Hat at 162.550 can also be received west of Maple Creek.

Meteorological Service of Canada

General Inquiries (Saskatoon)	(306) 975-4264
Weather Information	
Broadview	(306) 696-2229
Estevan	(306) 634-2833
Hudson Bay	(306) 865-2721
Lanigan	(306) 365-3011
Lloydminster	(780) 875-7709
Medicine Hat, AB	(403) 526-0483
North Battleford	(306) 445-7000
Prince Albert	(306) 929-2114
Regina	(306) 780-5744
Saskatoon	(306) 975-4266
Swift Current	(306) 773-5599
Whitewood	(306) 735-2928
Yorkton	(306) 782-1511
Severe Weather Reporting and Weather Awareness	
Call No Charge	1-800-239-0484

The **Crop Protection Planner,** a Windows-based computer program, is available to accompany this publication. The Planner will help you in making quick, accurate decisions about chemical pest control options. Access to an IBM-compatible computer is required.

For the current pricing or further details on this software, contact the U-Learn Centre at the University of Saskatchewan:

Phone: (306) 966-5565
Fax: (306) 966-5567
Web site: www.extension.usask.ca/Publications/

The Pest Control Products (Saskatchewan) Act and Regulations to that Act require that any person who applies a pesticide for commercial purposes must have a valid applicator's licence.

To be eligible for a licence, appropriate training is required from the Agriculture Division of SIAST:

Phone: 1-800-667-7730

Further details regarding licensing requirements can be obtained from the Inspection and Regulatory Management Branch of Saskatchewan Agriculture, Food and Rural Revitalization:

Phone: (306) 787-4662

The **Crop Protection Laboratory** offers a range of diagnostic services to assist in the identification of problems associated with all agricultural crops. The major areas of expertise include weed, insect and plant disease identification and herbicide resistance screening. Diagnostic submission forms are available from Rural Service Centres.

Fees:

Insect or weed identification	$10
Visual plant disease identification	$20
Cultured plant disease identification	$40
Herbicide resistance screening	$35 - $100

Phone: (306) 787-8130
E-mail: croplab@agr.gov.sk.ca

Crop Protection Companies

Arvesta
www.arvesta.ca
1-866-761-9397

BASF
www.agproducts.basf.com
1-877-371-2273

Bayer CropScience
www.bayercropscience.ca
1-888-283-6847

Cheminova
1-888-316-6260

Degesch America Inc.
www.degeschamerica.com
1-800-330-2525

Dow AgroSciences
www.dowagro.ca
1-800-667-3852

Dupont
www.dupont.ca/ag
1-800-667-3925

Engage Agro
www.engageagro.com
1-800-900-5487

Gustafson
www.gustafson.ca
1-800-880-9481

Hedley Technologies
www.hedleytech.com
1-888-476-4473

IPCO
204-233-3461

Monsanto
www.monsanto.ca
1-800-667-4944

Norac Concepts
www.noracconcepts.com
613-841-2907

Nufarm
www.nufarm.ca
1-800-868-5444

Peacock Industries
www.grasshoppercontrol.com
306-225-4691

Syngenta
www.syngenta.ca
1-800-665-9250

United Agri Products
www.uap.ca
1-800-561-5444

Valent BioSciences
www.valent.com
1-800-898-2536

Van Waters & Rogers
www.vwr-ltd.com
1-800-665-8888

HERBICIDE ROTATION - 2003

To delay the onset of resistance, include herbicides from as many different herbicide groups as possible for each weed. Refer to page 27 for more information.

ROTATION GRASS HERBICIDES

GROUP 1
Achieve, Assure II, Champion^{120} Extra*, Champion Plus*, FlaxMax, Freedom Gold*, Fusion, Harmony Total*, Horizon, Hoe-Grass 284, Hoe-Grass II*, Laser DF*, Muster Gold*, Poast Ultra, Prevail*, Puma^{120} Super, Pursuit Ultra*, Select, Triumph Plus*, Venture

GROUP 2
Accent, Assert, Everest, K2*, Odyssey, Pursuit, Sundance

GROUP 3
Edge, Fortress*, Trifluralin

GROUP 4
Accord

GROUP 7
Stampede

GROUP 8
Avadex, Avenge, Eptam, Eradicane, Fortress*

GROUP 9
Eclipse*, Glyphosate, PrePass*, Rustler*

GROUP 10
Liberty

ROTATION BROADLEAF HERBICIDES

GROUP 2
Ally, Assert (Wild Mustard), Champion^{120} Extra*, Champion Plus*, Express Pack*, Freedom Gold*, Frontline*, Harmony Total*, K2*, Laser DF*, Muster, Odyssey, Pinnacle, Prism, PrePass*, Pursuit, Pursuit Ultra*, Refine Extra, Spectrum*, Sundance, Triumph Plus*

GROUP 3
Edge, Trifluralin

GROUP 4
2,4-D, 2,4-DB, MCPA, MCPB+MCPA, Accord, Attain, Banvel II, Buctril M/Mextrol*, Champion Plus*, Curtail M, Dichlorprop+2,4-D, Dyvel, Dyvel DS, Eclipse*, FlaxMax, Frontline*, Laser DF*, Lontrel, Prestige, Rustler*, Spectrum*, Target, and mixes containing these active ingredients

GROUP 5
Atrazine, PrimeExtra*, Sencor, Simazine

GROUP 6
Basagran, Buctril M / Mextrol*, Hoe-Grass II*, Pardner/Koril, Thumper*

GROUP 7
Linuron, Stampede

GROUP 9
Eclipse*, Glyphosate, PrePass*, Rustler*

GROUP 10
Liberty

* Some products contain more than one active ingredient and therefore may appear in more than one group.

SASKATCHEWAN AGRICULTURE, FOOD AND RURAL REVITALIZATION
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www.agr.gov.sk.ca

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